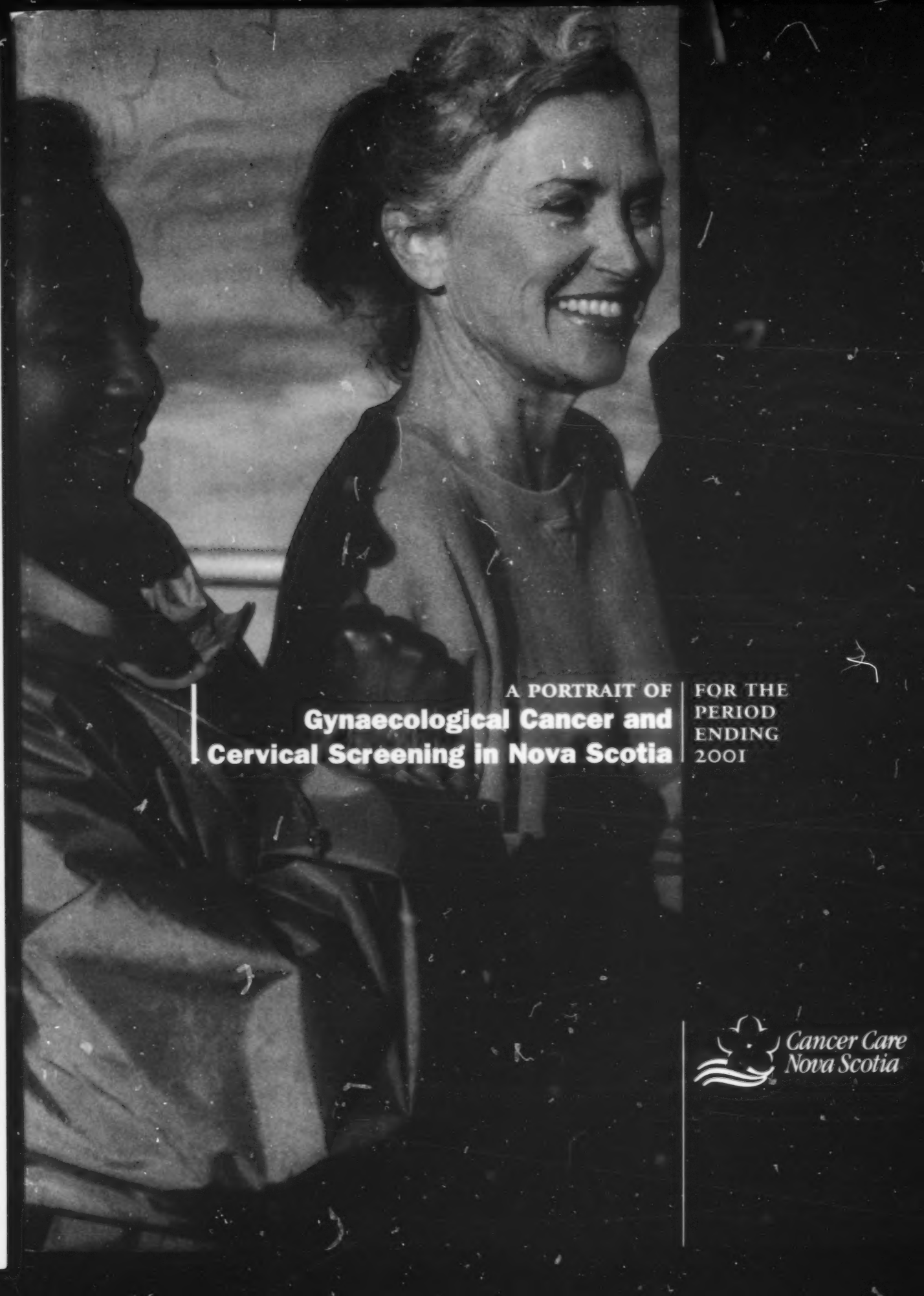

A PORTRAIT OF

Gynaecological Cancer and Cervical Screening in Nova Scotia

FOR THE PERIOD ENDING 2001

Cancer Care Nova Scotia

NOVA SCOTIA
Health

104-00548/

FOR THE PERIOD ENDING 2001

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Joanne Hamm	*Health Record Technician*
Karen Starratt	*Health Record Administrator*
Rosalee Walker	*Research Assistant*

Gynaecological Cancer Screening Program

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Kathy Miller	*Data Management Clerk*
Rhonda Miller	*Data Management Clerk*
Tamara Plante	*Administrative Assistant*
Tanya Richard	*Data Management Clerk*

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Please note: District Health Authority titles have been shortened in Figures 21-22 to accommodate space requirements. Full titles are available in Figure 7.

Foreword

Gynaecological cancers, like other cancers, place tremendous strain on individuals, families and communities. Over the last 40 years Nova Scotians have been focused on improving prevention strategies, promoting early detection, and advancing treatment options.

Quality data is essential to effective cancer control and is the basis upon which policies and programs are developed. The establishment of the Provincial Cytology/ Colposcopy Registry in 1978 to collect, process and analyze screening data, led to the development of the Gynaecological Cancer Screening Program in 1991. Its mandate is to decrease the incidence of gynaecological cancer in the province, with an initial focus on cervical cancer. The program integrated with *Cancer Care Nova Scotia (CCNS)* in 2002 and is recognized as one of the first organized cervical cancer screening programs in Canada.

Gynaecological cancer comprises approximately 12 per cent of all invasive cancers in Nova Scotia women. Cancer data for this report has been provided by the Cancer Registry operated by *CCNS'* Surveillance and Epidemiology Unit.

I would like to congratulate staff of the Gynaecological Cancer Screening Program and the Surveillance and Epidemiology Unit, who worked together to create this important publication. This report represents the first in a series of *CCNS* publications on specific cancer sites. Our hope is that it provides you with the information you need to enhance your decision making, assist in policy development and raise awareness about gynaecological cancers.

Please contact us by email at papforlife@ccns.nshealth.ca, by telephone at 1.866.599.2267 or by mail at the address listed at the back of this publication, should you require additional information. We also welcome your comments.

Andrew Padmos, Commissioner
Cancer Care Nova Scotia

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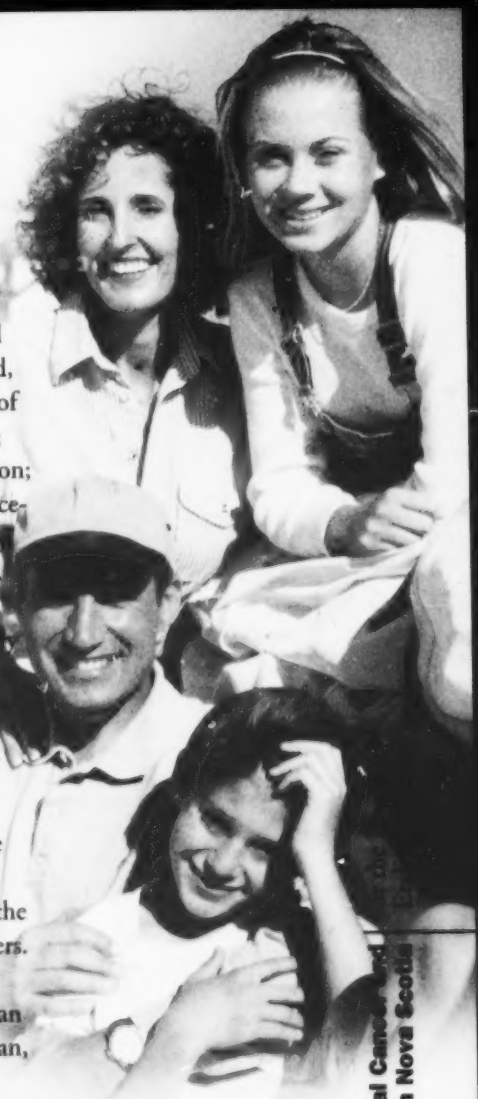


Introduction

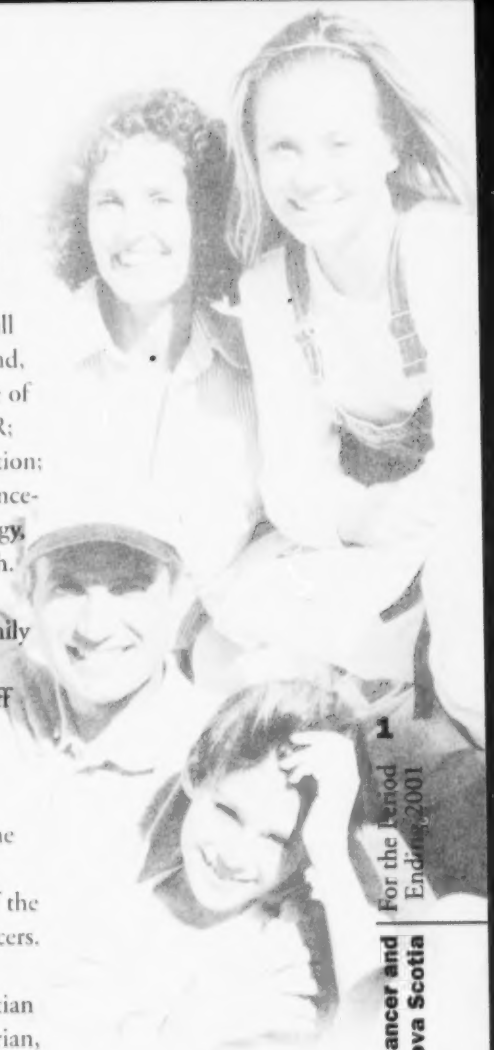
Nova Scotia has a long history of commitment to the prevention, early detection, prompt diagnosis and effective treatment of gynaecological cancer. Over the past 40 years, several provincial, cancer-specific programs have increased Nova Scotia's capacity to manage gynaecological cancer. The most notable of these are: in 1960, the Uterine Cancer Detection Program; in 1964, the Nova Scotia Cancer Registry; in 1978, the Provincial Cytology/Colposcopy Registry and; in 1991, the Gynaecological Cancer Screening Program (GCSP). Since 2002, both registries and the GCSP have been under the direction of *Cancer Care Nova Scotia* (*CCNS*), a program established by the Nova Scotia Department of Health in 1998 to coordinate, evaluate and strengthen cancer services in the province.

Each registry makes an important contribution toward gynaecological cancer control. The Cancer Registry collects and registers information from all diagnosed cases of cancer in the province. It is maintained by the Surveillance and Epidemiology Unit (SEU) of *CCNS* which reports cancer incidence, mortality and survival rates for the province. The SEU works with a variety of partners such as the GCSP on the research and evaluation of cancer control activities. The Provincial Cytology/Colposcopy Registry (PCCR) receives and registers information from all Pap smears conducted in the province and, since 1990, most colposcopies. The role of the GCSP includes: operating the PCCR; providing public and professional education; establishing ongoing evaluation of province-wide standards in cytology, histopathology and colposcopy; and conducting research.

The collective efforts of *CCNS* staff, family physicians, nurses, obstetrical and gynaecological specialists, laboratory staff and numerous volunteers are making a difference in managing gynaecological cancer. Evidence of this difference is reflected in a significant decrease over the last thirty years, for both incidence and mortality rates of cervical cancer, one of the three most common gynaecological cancers.

Each year approximately 270 Nova Scotian women are diagnosed with uterine, ovarian, or cervical cancer and about 95 die from these diseases, with some women — defined by age and/or region — suffering an unequal burden of gynaecological cancer. Clearly, more needs to be done to address the impact of these diseases in the Province. This report provides a portrait of gynaecological cancer in Nova Scotia that aims to assist cancer control efforts on all fronts, including prevention, research and health care planning.

Part one of this report presents cancer statistics for a thirty-one year period, 1971 through 2001. In part two, cervical cancer screening data are presented for a nine-year period, 1993-2001. 2001 is the most recent and complete year of data available for both registries.



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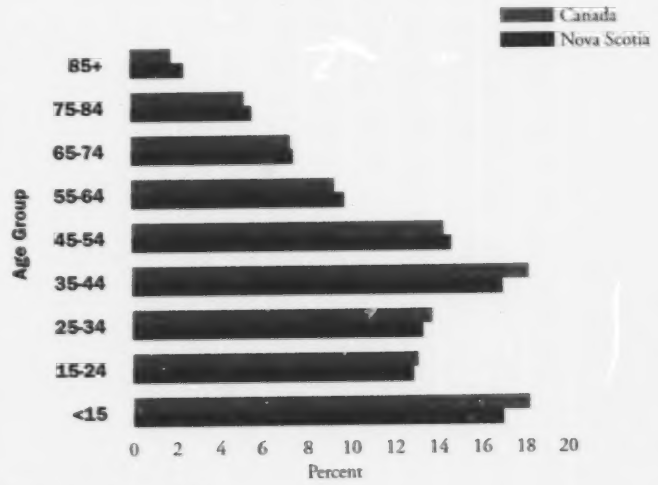
Population

Nova Scotia was home to 468,920 females in 2001, accounting for 52% of the province's total population. The population of interest for this report includes Nova Scotia females aged 15 and older, which represents over three-quarters (83%) of the total female population.[1]

Similar to the Canadian population in general, the female population of Nova Scotia is slowly aging as the 'baby boomer' generation (ages 35 to 54) enters mid-life (Figure 1). In 1996, the median age of females in the province was 36.5 years, just slightly older than the Canadian female population (36.0 years). It is estimated that by 2005, the median age of females in Nova Scotia will increase to 41 years, whereas it will increase to 39.7 years for females in Canada (Statistics Canada 2001).

Figure 1. Distribution of female population in Canada and Nova Scotia, by age group, in 2001

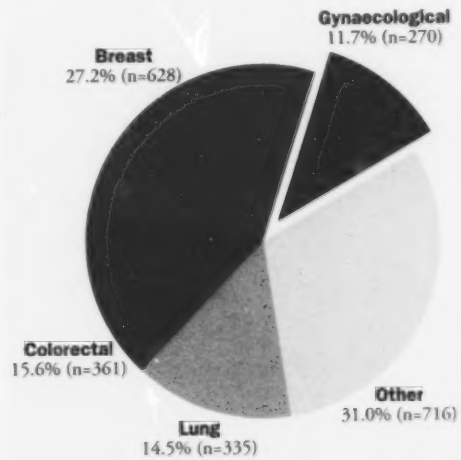


Source: Statistics Canada 2003

Gynaecological cancer in perspective

Gynaecological cancers represent approximately 12% of the cancers diagnosed in women living in Nova Scotia, and just under 10% of their deaths (Figures 2, 3). Uterine cancer is the fourth most common cancer among women in Nova Scotia following breast, colorectal, and lung. The aging female population noted earlier is particularly relevant for cancer, as increasing age is one of the most important risk factors (Schottenfeld & Fraumeni 1996). Age represents a lifetime of exposure to potential causative agents and as age increases, the likelihood of being diagnosed with or dying from cancer increases (Figure 4). As the population ages, there will be a concordant increase in the number of women diagnosed and dying of cancer in the province, including gynaecological cancers.

Figure 2. Cancer incidence frequencies among women, Nova Scotia 2001, (n=2,310)[1]



[1] Total number of cases (n) appears in parentheses

[1]PCCR data is often analyzed and reported in five-year age roll-ups. The five-year age grouping that includes 18 and 19 year old women is 15 – 19 years of age. The provincial screening recommendation is to commence screening at age 18 or when a woman becomes sexually active.

Figure 3. Cancer mortality frequencies among women, Nova Scotia 2001, (n=1,030)[1]

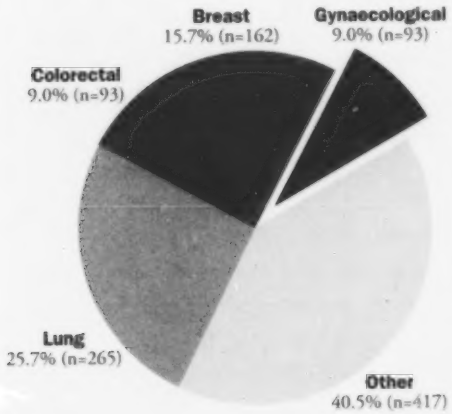


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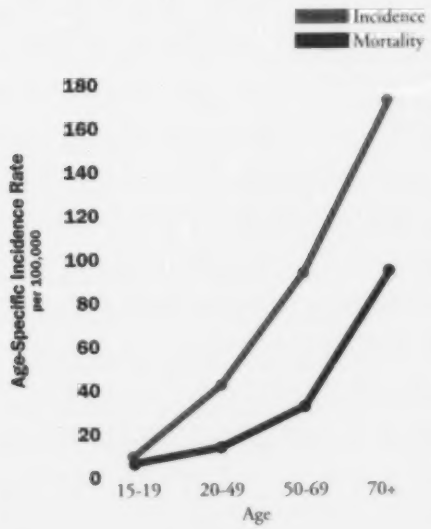
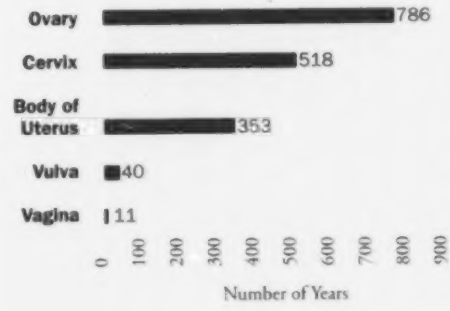
Figure 4. Age-specific incidence and mortality rates for all invasive gynaecological cancers, Nova Scotia 2001



Person-Years of Life Lost

Figure 5 shows the total Person-Years of Life Lost (PYLL) for each of the gynaecological cancers for 2001. PYLL, a measure of premature mortality, is the sum of the difference between the actual age at death and the expected age at death for those women who died from a gynaecological cancer. In 2001, Nova Scotia women lost a total of 1,708 years of life due to gynaecological cancer, of which ovarian cancer accounted for the greatest premature mortality (786 years), followed by cervical (518 years) and uterine cancer (353 years).

Figure 5. Person-years of life lost (PYLL) due to selected invasive gynaecological cancers, Nova Scotia 2001



Highlights

- In 2001, for women, gynaecological cancers represented 12% of all invasive cancers diagnosed in the province.
- Cervical, ovarian and uterine cancers accounted for 94% (1,279 cases) of all gynaecological malignancies diagnosed between 1997-2001.
- Seventy-five percent of all new invasive gynaecological cancers were diagnosed in women over the age of fifty years.
- The aging 'baby boomer' population in Nova Scotia is expected to result in an increase in the number of women diagnosed with a gynaecological cancer. By 2010, the number of women diagnosed with ovarian and uterine cancers is expected to increase by 34% and 37% respectively, relative to 2001.
- The incidence of cervical cancer decreased 52% between 1971-2001, similar to the Canadian experience. However, Nova Scotia continues to have the highest incidence of invasive cervical cancer in Canada.
- Age-standardized mortality rates for cervical and ovarian cancers decreased 60% and 39%, respectively over the past 31-year period.
- Nearly 500 women died of some form of invasive gynaecological cancer between 1997-2001.
- Between 1997-2001, geographical variations in the incidence of gynaecological cancer are seen in Nova Scotia. For cervical cancer, rates in Cape Breton (18.5 cases per 100,000) and Victoria (37.2 cases per 100,000) counties exceed the provincial average (11.3 cases per 100,000), whereas the rate in Kings County (5.6 cases per 100,000) is well below average.
- Cape Breton District Health Authority, showed the highest growth in Pap screening participation between 1993-2001 (2.6% average annual change), concurrent with targeted interventions in the district.
- In 2001, over 176,000 Pap smears were performed in Nova Scotia, representing an increase of 6% from 1993 (165,900 Pap smears).
- In 2001, over 60% of women had at least one Pap screen in the previous three year period, a figure that remains below the GCSP target of 85%.
- Less than 1% of Pap smears are reported as unsatisfactory in quality, indicating a high level of competence among health professionals performing this service in the province.
- Younger women are the most likely to have a Pap smear but older women (55 to 84 years) had the greatest average annual percentage increase between 1993 and 2001.

Gynaecological Cancer Profile

Cancer Registry background

The ability to profile and understand the occurrence and patterns associated with the many diseases that collectively are referred to as 'cancer' is a critical aspect of operating a comprehensive cancer control program. In Nova Scotia, responsibility for cancer control falls under the auspices of *Cancer Care Nova Scotia*, a program of the provincial Department of Health. This program oversees the operation of a population-based cancer registry that collects key data related to individuals diagnosed with cancer. Nova Scotia has operated a cancer registry since 1964, which today, almost forty years later, provides a rich resource for research, including the production of descriptive information on the cancer situation in this province. This report has utilized the Registry to examine the occurrence and patterns related to gynaecological cancers for a variety of time periods, starting in 1971 and ending in 2001. A detailed methodology and reference to data sources and quality can be found in Appendix A.

Incidence and mortality by age and region

Over thirteen-hundred women in Nova Scotia were diagnosed with some form of invasive gynaecological cancer between 1997-2001 (Table 1). Uterine, ovarian and cervical cancers accounted for 94% of all incident cases reported during this period.

Overall, the incidence of cancer increased considerably with age, with nearly 75% of all new cases being diagnosed after the age of 50 years (Table 1).

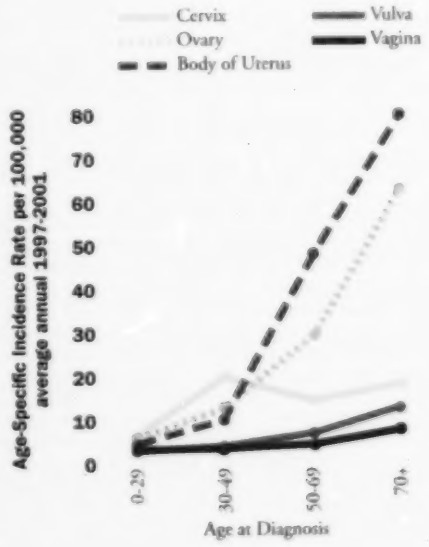
Women aged 50-69 had an increased risk of developing uterine cancer relative to cancers of the cervix, ovary, vulva or vagina (Figure 6). Uterine cancer remained the most common type of gynaecological cancer among women age 70+.

Table 1. Incidence counts[1] and rates[2] for selected gynaecological cancers, Nova Scotia 1997-2001

Cancer Site	Age at Diagnosis				1997-2001		2001	
	15-29	30-49	50-69	70+	Total Incidence	Rate per 100,000	Total Incidence	Rate per 100,000
Cervix	21	156	71	40	288	11.3	60	11.8
Ovary	14	87	169	159	429	14.9	69	11.5
Body of Uterus	<5	67	285	208	562	19.3	117	19.5
Vagina	<5	<5	7	12	23	0.7	8	1.2
Vulva	0	13	16	29	58	1.9	17	2.6
Total	**38**	**326**	**548**	**448**	**1,360**	**48.1**	**271**	**46.6**

[1] Age-specific/site-specific counts < 5 are not presented to ensure confidentiality
[2] Rates are standardized to the age distribution of the 1991 Canadian population

Figure 6. Age-specific incidence rate for selected gynaecological cancers, Nova Scotia 1997-2001



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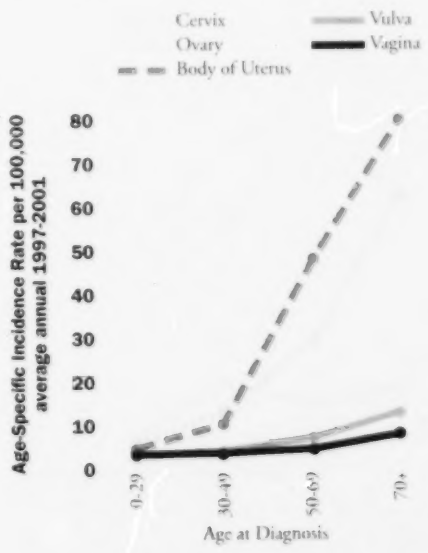

Women aged 30-49 appeared to be at increased risk of cervical cancer. However, this increase in incidence may simply reflect an increase in cancer detection, resulting from the high Pap screening participation rate among women of this age group (see section: Cervical Cancer Screening Profile) — this pattern is commonly referred to as a screening effect: where more women are being screened, more cancers are being detected.

Nearly 500 women died of some form of invasive gynaecological cancer between 1997-2001 (Table 2). Ovarian cancer accounted for half (49.5%) of these deaths. The etiology of this disease is complex, with cell types having distinctive etiologic factors. The higher mortality associated with ovarian cancer is due in part, to advanced stage at diagnosis (Schottenfeld and Fraumeni 1996).

Regional variations in the incidence of cancer were examined on two geographical scales: (1) by county and (2) by district health authority (DHA; see Figure 7). Since Nova Scotia is fairly small in size, with a population that is fairly homogeneous in genetic, social, cultural, occupational and environmental traits, one would expect little variation in the patterns of cancer incidence throughout the province. Nevertheless, regional disparities do exist in Nova Scotia.

Table 2. Mortality counts and rates for selected gynaecological cancers, Nova Scotia 1997-2001

Cancer Site	Total Deaths	Rate[1] per 100,000	95% CI[2]
Cervix	97	3.4	[2.7, 4.1]
Ovary	229	7.4	[6.4, 8.4]
Body of Uterus	115	3.5	[2.9, 4.2]
Vagina	7	0.2	[0.04, 0.3]
Vulva	15	0.4	[0.2, 0.6]
Total	**463**	**14.5**	**[13.5, 16.3]**

[1] Rates are standardized to the age distribution of the 1991 Canadian population.
[2] 95% confidence intervals are shown in parentheses.

Figure 7. Nova Scotia female (aged 15+) population counts by region, 2001

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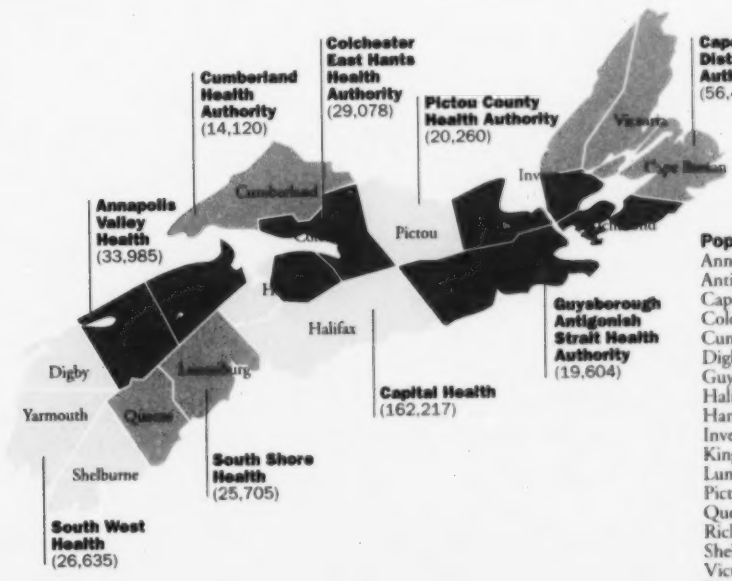


The majority of all new cancer cases and cancer-related deaths are diagnosed in the largest population centers: Halifax and Cape Breton counties being the largest centers at the county level and Capital Health and Cape Breton District Health Authority, being the largest DHAs (Tables 3, 4; Figure 7). When cancer incidence is adjusted for population size and age (age-standardized cancer incidence rate), differences are more difficult to detect due to the variable nature of the data. However, at the county level, cervical cancer rates in Cape Breton (18.5 cases per 100,000) and Victoria (37.2 cases per 100,000) exceed the provincial average (11.3 cases per 100,000) by a significant margin, whereas those in Kings County (5.6 cases per 100,000) are below average (Figure 8). Rates of ovarian and uterine cancers also vary considerably by county but statistically significant patterns were only detected in Yarmouth County where the rate of ovarian

Table 3. Incidence counts for selected invasive gynaecological cancers, by region, Nova Scotia 1997-2001

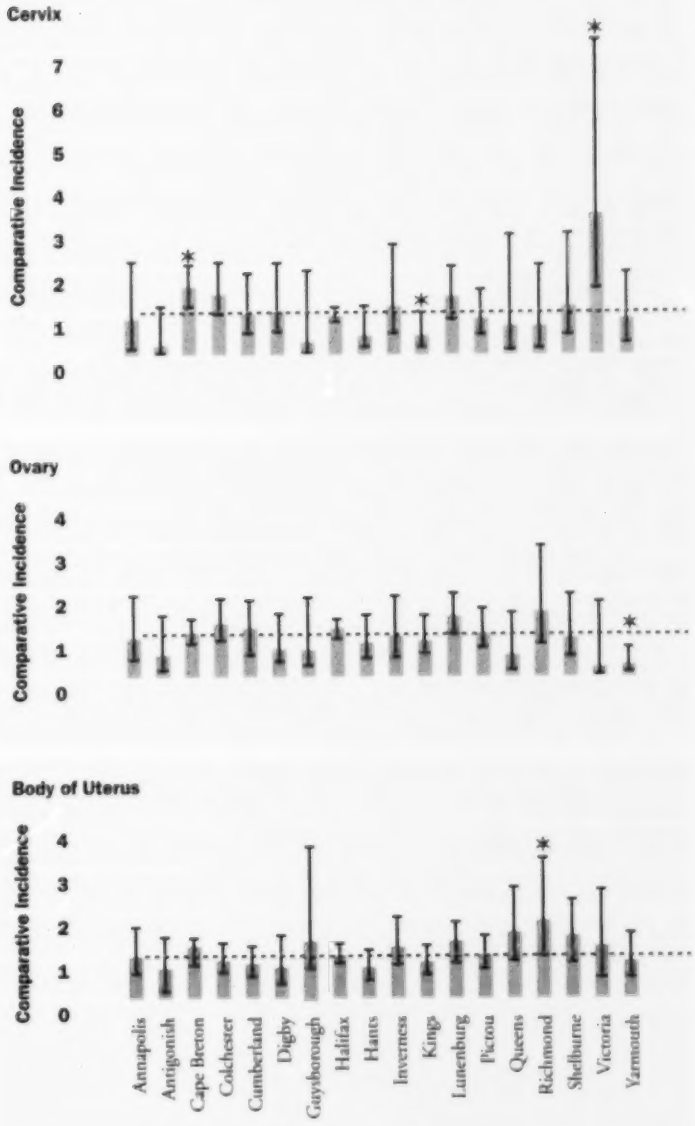
County	Cancer Site		
	Cervix	Ovary	Body of Uterus
Annapolis	< 5	11	16
Antigonish	< 5	< 5	8
Cape Breton	58	60	90
Colchester	21	32	27
Cumberland	10	18	20
Digby	7	9	12
Guysborough	< 5	< 5	10
Halifax	103	160	191
Hants	6	15	13
Inverness	7	9	16
Kings	9	23	27
Lunenburg	21	35	41
Pictou	14	24	30
Queens	< 5	< 5	13
Richmond	< 5	8	12
Shelburne	6	7	14
Victoria	7	< 5	6
Yarmouth	6	< 5	16
District Health Authority			
South Shore Health	24	39	54
South West Health	19	20	42
Annapolis Valley Health	13	34	43
Colchester East Hants Health Authority	26	40	32
Cumberland Health Authority	10	18	20
Pictou County Health Authority	14	24	30
Guysborough Antigonish Strait Health Authority	7	19	34
Cape Breton District Health Authority	71	67	108
Capital Health	104	167	199
All Nova Scotia[1]	**288**	**429**	**582**

[1] 1 case could not be assigned to a specific county or district health authority

Table 4. Number of deaths due to selected invasive gynaecological cancers, by region, Nova Scotia 1997-2001

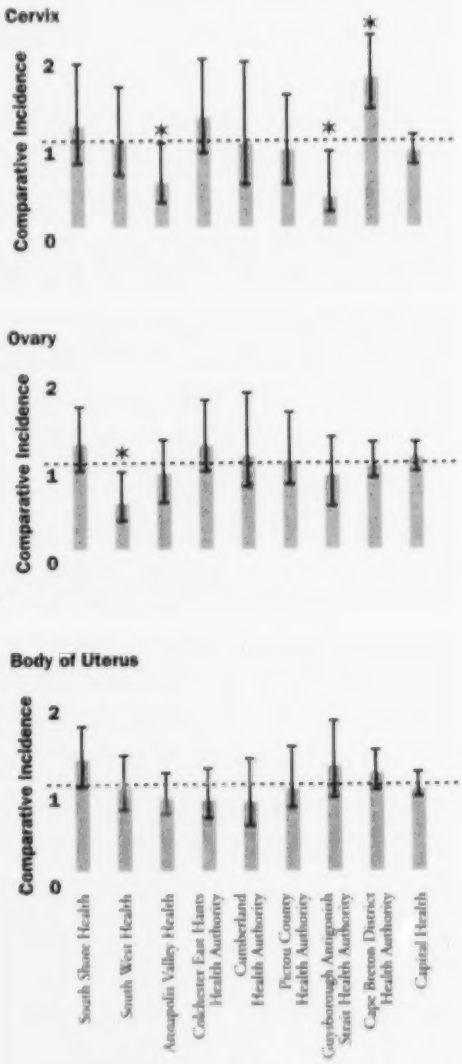
County	Cancer Site		
	Cervix	Ovary	Body of Uterus
Annapolis	< 5	12	6
Antigonish	< 5	< 5	< 5
Cape Breton	20	39	22
Colchester	< 5	14	5
Cumberland	< 5	9	5
Digby	< 5	9	4
Guysborough	0	< 5	< 5
Halifax	35	68	27
Hants	6	11	6
Inverness	< 5	8	< 5
Kings	< 5	14	< 5
Lunenburg	8	12	< 5
Pictou	5	13	9
Queens	< 5	< 5	< 5
Richmond	0	< 5	< 5
Shelburne	0	5	< 5
Victoria	< 5	< 5	< 5
Yarmouth	< 5	< 5	< 5
District Health Authority			
South Shore Health	10	14	5
South West Health	< 5	18	10
Annapolis Valley Health	6	26	10
Colchester East Hants Health Authority	5	16	7
Cumberland Health Authority	< 5	9	5
Pictou County Health Authority	5	13	9
Guysborough Antigonish Strait Health Authority	< 5	10	10
Cape Breton District Health Authority	23	46	28
Capital Health	38	77	31
All Nova Scotia	**97**	**229**	**115**

Figure 8. Comparative incidence figures (CIF) based on age-standardized incidence rates[1], comparing county to provincial level estimate, Nova Scotia 1997-2001. The rate of cancer in a given county varies significantly from that of the province if the 95% confidence interval (⟼) of the CIF value ( ) does not cross the dotted black reference line (i.e. the Nova Scotia estimate). Age-standardized rates that differ significantly from the provincial average are shown with an asterisk (*).



[1] Rates are standardized to the age distribution of the 1991 Canadian population

Figure 9. Comparative incidence figures (CIF) based on age-standardized incidence rates[1], comparing district health authority (DHA) to provincial level estimate. Nova Scotia 1997-2001. The rate of cancer in a given DHA varies significantly from that of the province if the 95% confidence interval (⟼) of the CIF value ( ) does not cross the dotted black reference line (i.e. the Nova Scotia estimate). Age-standardized rates that differ significantly from the provincial average are shown with an asterisk (*).



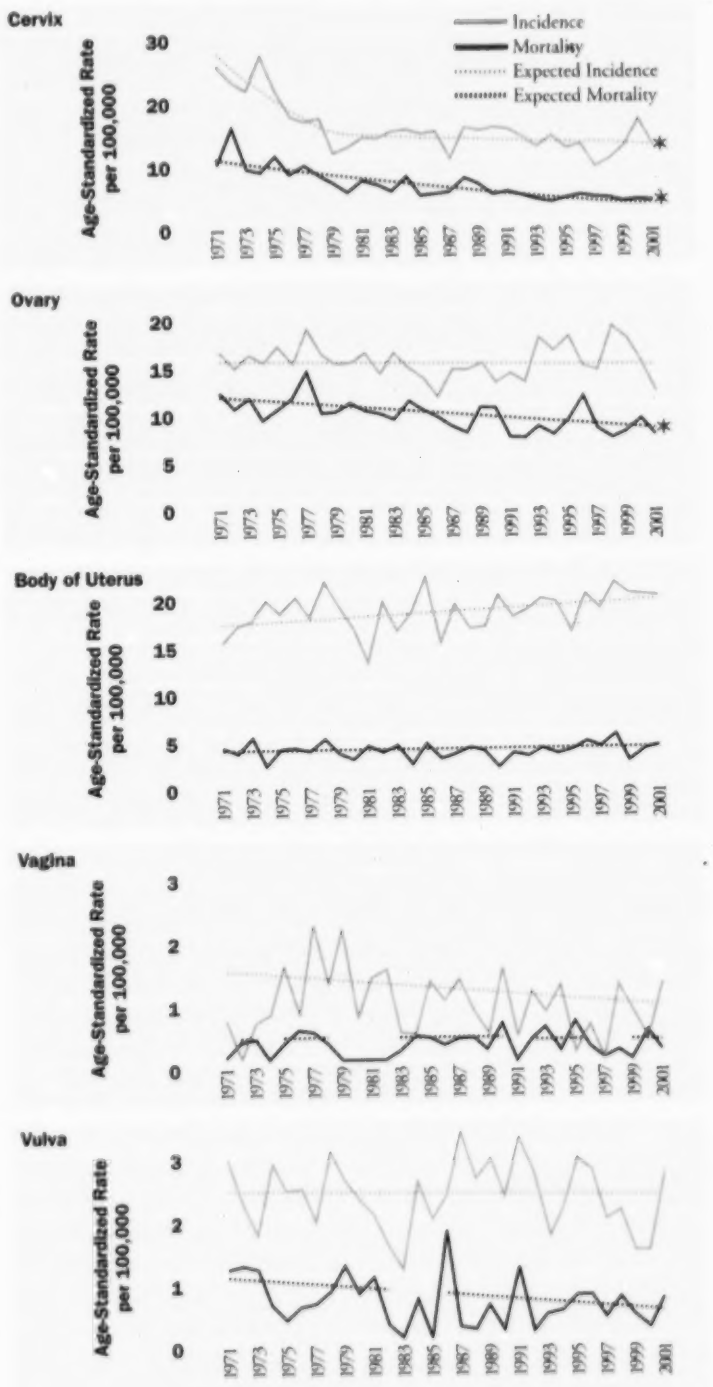
[1] Rates are standardized to the age distribution of the 1991 Canadian population

cancer (4.0 cases per 100,000) was below the provincial average (14.9 cases per 100,000); and in Richmond County where the rate of uterine cancer (34.6 cases per 100,000) appears greater than the provincial average (19.3 cases per 100,000) (Figure 8).
In comparing age-standardized incidence rates at the district health authority level (Figure 9), most disparities are again observed for the incidence of cervical cancer, with Cape Breton District Health Authority exhibiting a higher rate relative to the provincial average, while Annapolis Valley Health and Guysborough Antigonish Strait Health Authority demonstrated significantly lower rates. Rates of ovarian and uterine cancers fell mostly within the provincial average, with the exception of South West Health where the rate of ovarian cancer was lower.

Time trends

Important decreases in age-standardized mortality due to cervical and ovarian cancers were found over the 31-year reporting period (dropping 60% and 39%, respectively; Figure 10). The incidence of cervical cancer also decreased 52% (24 to 12 cases per 100,000) between 1971-2001. Most of this reduction in the incidence of cervical cancer was observed between 1971-1979, coinciding with the broader application of cervical cytology screening tests (Papanicolaou or 'Pap' tests) and colposcopy. Incidence rates remained relatively constant thereafter, although a recent trend of increased incidence was observed between 1998-2000. While temporal trends were observed for these more common cancers, little can be said with any confidence for the rarer cancers (e.g., vagina and vulva) due to the limitations of detecting significant patterns derived from low numbers and small population size.

Figure 10. Trends in age-standardized incidence (solid, light blue) and mortality (solid, dark blue) rates[1], by cancer sites, Nova Scotia 1971-2001. Regression lines (dotted line) indicate general tendencies. Rates that have changed significantly over time are shown with an asterisk (*).

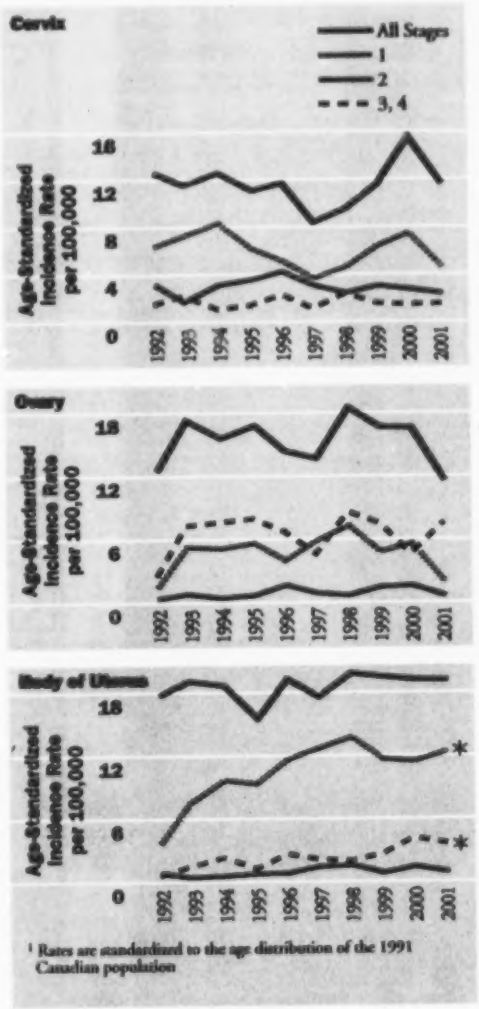


[1] Rates are standardized to the age distribution of the 1991 Canadian population

Overall age-standardized incidence rates (i.e., all stages combined) have remained relatively constant for cervical, ovarian and uterine cancers between 1992-2001 (Figure 11). Cervical and uterine cancers were generally diagnosed at an early stage (stage 1). In contrast, ovarian cancers were diagnosed at a later stage (stages 3,4). Stage 1 and stage 3,4 diagnoses of uterine cancer increased significantly between 1992-2001 ($p < 0.001$), showing an average annual increase of 8% and 15%, respectively. This increase in diagnoses does not directly reflect an increased burden of uterine cancers, as the overall rates of uterine cancers (i.e., all stages combined) remain stable over time. Instead, this increase coincides with a decrease of 80% in the documentation of uterine cancers with an 'unknown' stage during the period 1992-2001; a decrease that reflects a change in the staging system and its consistent application over time.

In contrast, the elevated incidence rates of cervical cancer observed for the period 1998-2000 (Figure 11) clearly coincide with an increase in stage 1 diagnoses as the proportion of cases with an 'unknown' stage did not change over time. As such, the increased stage 1 detection likely reflects the recent efforts of the GCSP to encourage Pap screening in women who were previously unscreened or under-screened (see Appendix B).

Figure 11. Trends in age-standardized incidence rates[1] of cervical, ovarian and uterine cancers by stage (1, 2, 3, 4) of disease at diagnosis, Nova Scotia 1992-2001. Rates that have changed significantly over time are shown with an asterisk (*).



Survival, prevalence and projections

Cancer survival refers to the amount of time between first diagnosis and death. It is a measure of prognosis influenced by the nature of the disease, availability and effectiveness of treatment, as well as the stage of disease at the time of diagnosis.

In this section of the report we present the survival of women diagnosed with cervical, ovarian or uterine cancers between 1992-2001. Survival is expressed 'relative' to mortality rates of women unaffected by cancer.

Figure 12. Five-year relative survival for selected gynaecological cancers, Nova Scotia 1992-2001, with follow-up to the end of 2001. Total number of cases (n) retained for analysis and a 95% confidence interval (⊢—⊣) is presented for each estimate.

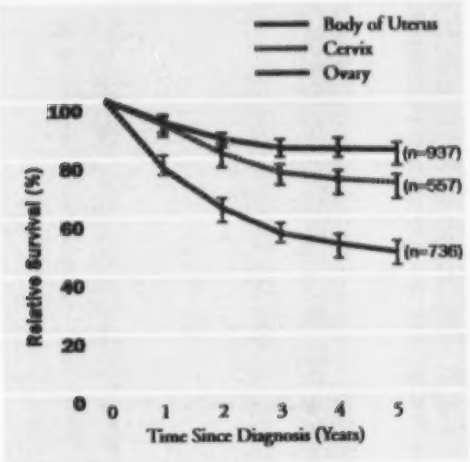


Figure 13. Cervical cancer relative survival by stage at diagnosis (1, 1A, 2, 3, 4), Nova Scotia 1992-2001, with follow-up to the end of 2001. Total number of cases (n) retained for analysis appears in parentheses.

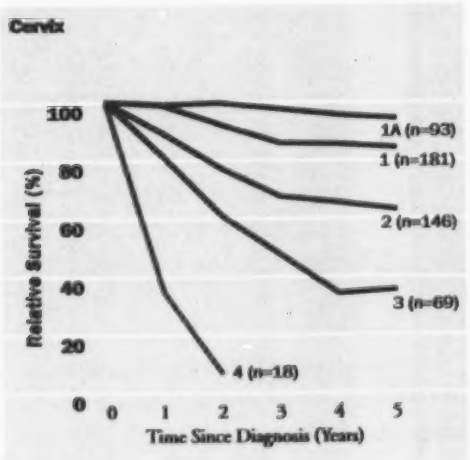


Figure 14. Ovarian cancer relative survival by stage at diagnosis (1, 2, 3, 4), Nova Scotia 1992-2001, with follow-up to the end of 2001. Total number of cases (n) retained for analysis appears in parentheses.

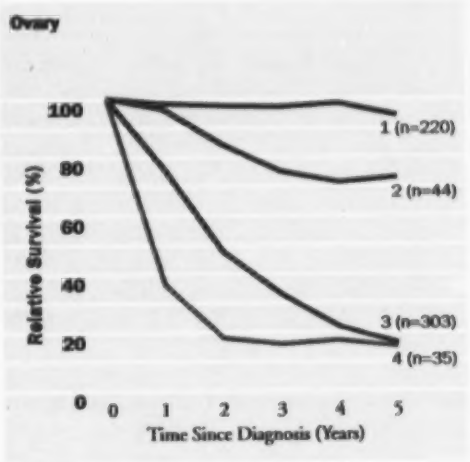
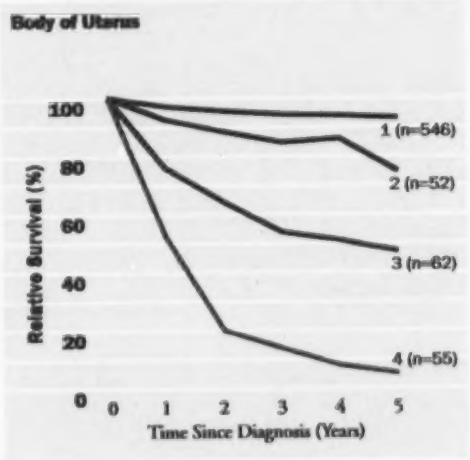


Figure 15. Uterine cancer relative survival by stage at diagnosis (1, 2, 3, 4), Nova Scotia 1992-2001, with follow-up to the end of 2001. Total number of cases (n) retained for analysis appears in parentheses.



The five-year survival rates for women diagnosed with the three most common invasive cancers, were highest for uterine cancer (82%), followed by cervical (70%) and ovarian (42%) cancers (Figure 12). The stage of the disease at diagnosis is known to be an important and consistent determinant of cancer survival. Irrespective of cancer type, survival rates were consistently higher for women diagnosed at an early disease stage (e.g., stages 1, 1A, 2; Figures 13-15).

In fact, the relative excess risk (RER) in cancer mortality was twelve times greater for women diagnosed with late stages of invasive cervical cancer (stages 3, 4) relative to those with early disease stages (Table 5). Similarly, women diagnosed with late stages of ovarian and uterine cancer demonstrated twenty-six and sixteen times more elevated RERs, respectively, than those diagnosed at an earlier stage. Hence, the likelihood of effectively controlling or curing cancer

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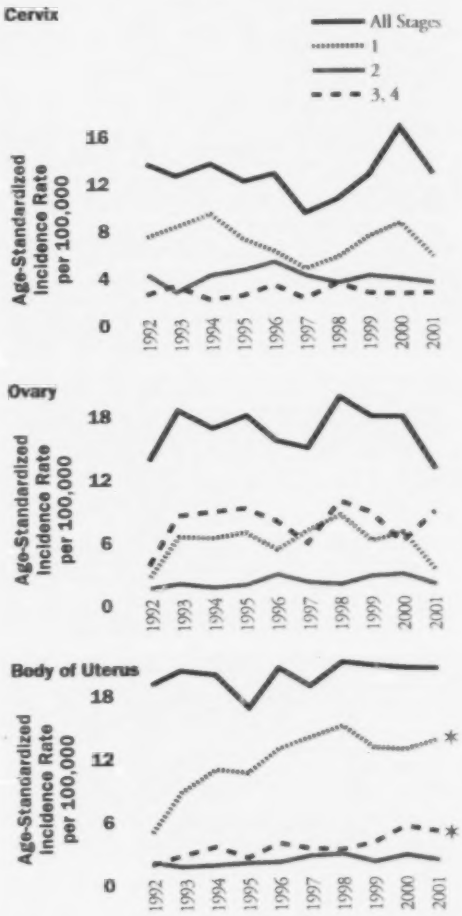

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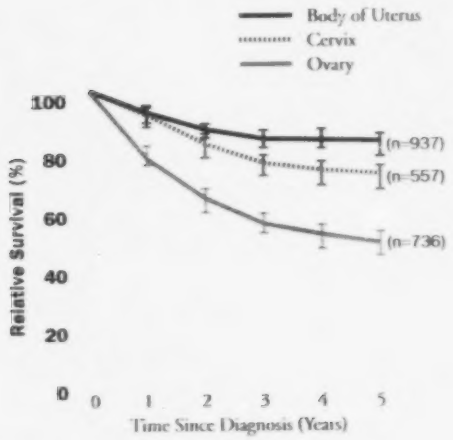

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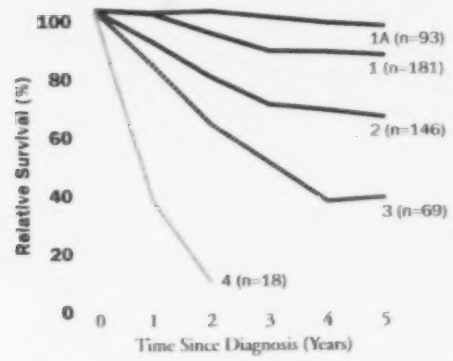

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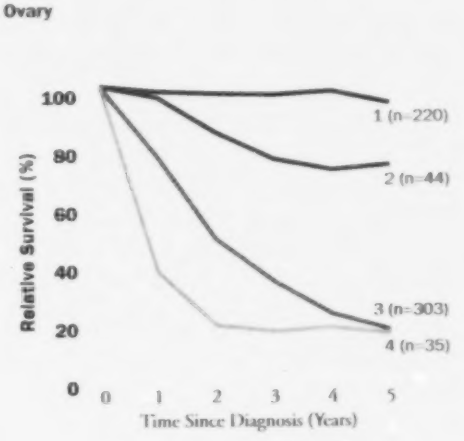

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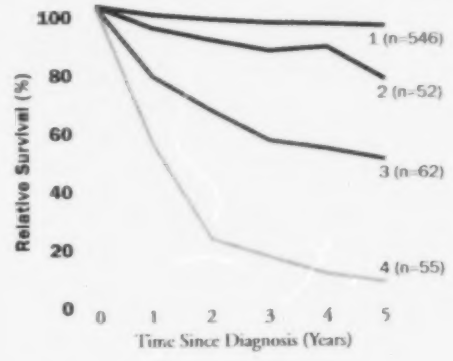

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Table 5. Relative excess risk (RER)[1,2] in cancer mortality as predicted by disease stage at diagnosis, selected gynaecological cancers, Nova Scotia 1992-2001

	Stage	RER	95% CI[3]
Cervix	2	4.3	[2.4, 7.5]
	3, 4	12.0	[6.5, 22.1]
Ovary	2	6.1	[1.9, 19.8]
	3, 4	26.0	[10.0, 67.7]
Body of Uterus	2	2.9	[1.1, 7.7]
	3, 4	16.0	[9.2, 27.9]

[1] Early stage (stage 1) is used as a reference group
[2] Estimates from regression model including age as a covariate
[3] 95% confidence intervals are shown in parentheses

Table 6. Age-specific relative survival rates at one, three and five years post diagnosis, Nova Scotia 1992-2001, with follow-up to the end of 2001

		Relative Survival (%)[1]					
	Age	1 year		3 year		5 year	
Cervix	15-29	97.1	[91.5, 100.0]	77.4	[62.6, 92.3]	72.0	[54.7, 89.2]
	30-49	95.6	[93.1, 98.1]	82.5	[77.5, 87.5]	79.1	[73.5, 84.7]
	50-69	91.6	[86.5, 96.7]	72.1	[63.2, 81.0]	60.7	[50.0, 71.4]
	70+	73.6	[64.7, 82.5]	54.4	[42.8, 66.0]	54.4	[41.3, 67.5]
Ovary	15-29	100.0	[100.0, 100.0]	95.6	[86.8, 100.1]	87.7	[70.7, 100.2]
	30-49	93.9	[90.1, 97.6]	79.2	[72.6, 85.9]	74.0	[66.5, 81.6]
	50-69	79.8	[74.8, 84.8]	49.1	[42.4, 55.9]	38.5	[31.2, 45.9]
	70+	63.3	[57.2, 69.5]	39.0	[32.2, 45.9]	30.4	[22.9, 37.8]
Body of Uterus	15-29	n/a[2]	n/a	n/a	n/a	n/a	n/a
	30-49	93.9	[89.1, 98.8]	87.9	[80.9, 95.0]	86.8	[79.3, 94.3]
	50-69	94.5	[92.1, 96.8]	88.8	[85.2, 92.4]	85.8	[81.3, 90.3]
	70+	87.1	[83.1, 91.1]	75.6	[69.5, 81.6]	73.2	[65.5, 81.0]

[1] 95% confidence intervals are shown in parentheses
[2] n/a, not available as the number of women aged 15-29 and diagnosed with uterine cancer between 1992-2001 was too small (< 5 cases) to compute estimates

diminishes enormously when a cancer is diagnosed in its later stage. Early detection, where possible, remains the best alternative to primary prevention.

Age at diagnosis was the second-most important determinant of prognosis. However, this influence varied considerably with the type of cancer and the time elapsed since diagnosis. For instance, younger age at diagnosis was associated with better one-year, three-year and five-year survival for women diagnosed with ovarian cancer (Table 6). For ovarian cancer, the five-year relative survival rates were markedly better (57% higher) for women aged 15-49 years (80.9% survival on average) relative to women aged 50 and over (34.5% survival on average). Such age-related reductions in relative survival rates were not observed for cervical or uterine cancers. In fact, for cervical cancer, marginally higher long-term survival rates were observed for women aged 30-49 relative to women of all other age groups; for uterine cancer, age had no directly measurable influence on survival.

While trends in cancer survival were not examined, a previous report suggested that the rate of cancer incidence in Nova Scotia

was increasing more rapidly over time than the rate of cancer mortality (Saint-Jacques et al. 2002) and, as a consequence the prevalence of Nova Scotians diagnosed with cancer has increased with time. Indeed, the number of women living with a diagnosis of gynaecological cancer increased 12% between 1997-2001 (Table 7). Ovarian cancer accounts largely for this increase (26%) and is co-incident with the significant reduction in women dying of ovarian cancer in recent years (see Figure 10).

Nova Scotia's population is rapidly aging and the number of cancer cases is rising (Saint-Jacques et al. 2002). By the year 2010, the incidence of ovarian and uterine cancer is expected to increase 34% and 37% respectively relative to 2001, while that of cervical cancer is expected to decrease 8% (Table 8). This expected increase in uterine and ovarian cancer and associated burden to the health care system must be strategically addressed. The continuous reduction of invasive cervical cancer is encouraging and clearly reflects substantial progress in our understanding of the natural history of cervical cancer, advances in treatment and increased availability of Pap smear screening programs (Franco et al. 2001). However, Nova Scotia continues to have the highest incidence of cervical cancer in Canada.

Table 7. Fifteen-year limited cancer prevalence[1], Nova Scotia 1997-2001

	Number of women living with invasive cancer[2]				
Cancer Site	**Year**				
	1997	**1998**	**1999**	**2000**	**2001**
Cervix	525	515	515	535	550
Ovary	390	415	455	480	490
Body of Uterus	900	920	940	955	980
Vagina[3]	15	20	25	25	40
Vulva[3]	110	110	110	105	105
Total	**1,940**	**1,980**	**2,045**	**2,100**	**2,165**

[1] Figures include all Nova Scotia residents known to be alive in the stated year, and diagnosed with invasive cancer within the preceding 15 years
[2] Prevalence figures have been rounded to reflect the imprecision of this process
[3] Figures are to be interpreted cautiously as they are based on a small number of cases

Table 8. Actual and projected[1] annual cancer incidence (new cases), Nova Scotia

	Projected[2]		
Cancer Site	**2001 Incidence**	**2005 Incidence**	**2010 Incidence**
Cervix	60	60	55
Ovary[3]	86	100	115
Body of Uterus	117	135	160

[1] Projected counts are based on 1986-2001 incidence data
[2] Projected counts have been rounded to reflect the imprecision of this process
[3] 2001 incidence counts are based on a 5-year average (1997-2001) due to unusually low counts for 2001

Cervical Cancer Screening Profile

GCSP background

Invasive cancer of the cervix is almost entirely preventable if women undergo regular Pap test screening and appropriate management of any subsequent abnormalities detected by the test. This, unfortunately, is not the case for ovarian, uterine, or vulvar malignancies. Given the potential for prevention of cervical cancer, and in response to Canadian recommendations, Nova Scotia instituted an organized population-based cervical cancer screening program in 1991. The program built on a significant body of work carried out in the province over the previous thirty years by many committed individuals, mostly gynaecologists and gynaecologic oncologists.

Further incentives to the establishment of an organized program in Nova Scotia were (1) the existence since 1978 of a provincial registry of Pap smears and (2) the consistently high incidence and mortality rates from cervical cancer for Nova Scotia as reported in annual editions of Canadian Cancer Statistics. A four-pronged mandate was vested in the GCSP by the Department of Health with the goal of decreasing morbidity and mortality associated with the disease. The mandate included: assuming responsibility for the provincial cytology registry; developing, implementing and monitoring standards and guidelines relative to screening and management of abnormalities; assuming responsibility for public and professional education regarding prevention and early detection of cervical cancer; and research.

Over the past twelve years, the GCSP has made progress in all areas of the mandate. Early on, the Program adopted the nationally-recommended goal of screening 85% of women at risk at least once in every three-year period. This is considered a realistic goal and the Program continues striving to achieve it. Given the overall low screening participation in Nova Scotia, the Program has recommended annual screening for all women from age 18, or at the onset of sexual activity. There is no upper age limit. This annual screening recommendation is more stringent than other jurisdictions but is considered necessary to raise awareness about the benefits of screening and to establish regular screening practices with all women and their providers.

The 1978 Cytology Registry was redesigned and renamed the Provincial Cytology/Colposcopy Registry (PCCR) in 1992 (see Appendix C). This redesign significantly improved capacity to access and analyze screening data. As a result of the subsequent analysis, public and professional education campaigns and research initiatives focused on women forty years of age and older who appeared to be dropping out of regular screening. The work of the GCSP Regional Resource Network, Program volunteers and staff, physicians, nurses, and lab technologists resulted in retention of more women in this target group over time as well as increased recruitment of previously underscreened or unscreened women. Although this report demonstrates that success, there is still much to be done,

particularly in the area of educating women aged fifteen to nineteen to appreciate the benefits of adopting screening when appropriate as a healthy lifestyle choice.

Further upgrade of the Registry took place in 2002, creating increased functionality; a key feature is the ability to address data quality in a timely manner. One of the initial staff projects is identification and resolution of duplicate patients in the Registry. Once complete, the population base will be adjusted to identify those women no longer at risk for cervical cancer as a result of surgical removal of the cervix and no prior abnormal screening history. Statistics presented in this report are based on population figures and a data set that have not excluded women who have had a hysterectomy nor have all duplicates been resolved. Some of the findings reported therefore reflect an underestimation of eligible women screened. A detailed methodology and reference to data sources and quality can be found in Appendix D.

Each year the GCSP works with more than 100 volunteers and several organizations such as the Nova Scotia Department of Health, the Medical Society of Nova Scotia, and the Canadian Cancer Society – Nova Scotia Division to increase awareness of the importance and benefits of annual Pap screening. The public and professional education campaigns target Nova Scotia women 18 years of age and older, or those who are sexually active, in an attempt to increase annual Pap screening participation rates across the province.

Pap screening participation rates – overall

Table 9 shows the percentage of Nova Scotia women aged 15 and older in compliance with the annual Pap screening recommendation. Screening has increased slowly but steadily over time. Between 1988 and 2001, the percentage of women screened increased from 37% to 41%, representing average annual growth of just under 1% (0.7%). While this percentage change may appear insignificant, it translates into an additional 1,200 women being screened each year, on average, from the previous year. Some of this gain however, may be attributable to population growth. The 2001 annual rate is similar to those reported elsewhere for women aged 20-69[1] (2000 Ontario rate, 41%; Ontario Cervical Screening Program 2001 – 2001 Prince Edward Island rate, 42%; PEI Pap Screening Program 2002).

Table 9. Percentage (%) of women aged 15+ screened, Nova Scotia 1993-2001

Screening Period	Women Screened	Women Aged 15+[1]	% Screened	95% CI[2]
Annual				
1988	133,644	362,238	36.9	[36.7, 37.1]
1989	135,589	366,146	37.0	[36.9, 37.2]
1990	142,084	369,346	38.5	[38.3, 38.6]
1991	143,409	372,647	38.5	[38.3, 38.6]
1992	142,650	375,423	38.0	[37.8, 38.2]
1993	145,680	378,330	38.5	[38.4, 38.7]
1994[3]	135,784	380,688	35.7	[35.5, 35.8]
1995[3]	147,758	382,718	38.6	[38.5, 38.8]
1996	151,167	385,539	39.2	[39.1, 39.4]
1997	153,014	388,255	39.4	[39.3, 39.6]
1998	155,238	390,635	39.7	[39.6, 39.9]
1999	157,733	393,431	40.1	[39.9, 40.2]
2000	158,584	395,945	40.1	[39.9, 40.2]
2001	159,338	388,055	41.1	[40.9, 41.2]
Three-Year				
1987-1989	224,796	362,238	62.1	[61.9, 62.2]
1990-1992	237,385	372,647	63.7	[63.5, 63.9]
1993-1995[3]	240,200	380,688	63.1	[62.9, 63.2]
1996-1998	250,980	388,255	64.6	[64.5, 64.8]
1999-2001	256,208	395,945	64.7	[64.6, 64.9]

[1] Represents total female population aged 15 and older; data is not hysterectomy cleared and, therefore, overestimates the total female population at risk
[2] 95% confidence intervals are shown in parentheses
[3] 14% of the provincial data is currently missing for 1994 and 2% is missing for 1995

[1] One should note that Ontario and Prince Edward Island report on women aged 20-69, whereas Nova Scotia reports on women aged 15-90+

Table 10. Percentage of women screened, by prior screening status, Nova Scotia 1993-2001

Status	1993	1994	1995	1996	1997	1998	1999	2000	2001
Overscreened	5.2	4.9	3.8	3.7	3.8	3.5	3.6	3.5	3.5
Possibly Overscreened	2.7	2.7	2.6	2.6	2.5	2.2	2.0	2.1	2.2
Screened	49.1	50.2	48.1	50.5	51.8	53.2	53.9	54.4	54.4
Follow-Up	1.8	1.6	1.3	1.6	1.4	0.9	1.1	1.3	1.8
Underscreened	30.5	29.8	34.0	32.3	31.8	31.3	30.8	30.4	30.0
Unscreened	10.7	10.7	10.2	9.2	8.8	8.8	8.6	8.2	8.1

Figure 16. Percentage of women aged 15+ considered to be overscreened, Nova Scotia 1993-2001

Table 9 also shows the percentage of women being screened every three years, benchmarking against the goal of screening 85% of eligible women every three years. Between 1999 and 2001, approximately two-thirds of Nova Scotia women (65%) were screened at least once. The three-year Pap screening rate has increased slowly but steadily from 1988, averaging annual growth of less than half a percent (0.33%). The three-year rate is similar to those reported elsewhere[1] (1999-2001 Prince Edward Island rate, 65%; PEI Pap Screening Program 2002 – 1998-2000 British Columbia rate, 61%; Cervical Cancer Screening Program 2001).

The Pap screening status of women screened between 1993 and 2001 is shown in Table 10. The PCCR codes the prior screening status of every woman who has a Pap smear. It is then possible to determine, in any given year, how many of the women screened had not had a Pap smear in the previous five years (underscreened), for example or had more than one Pap smear performed in a twelve month period without recommendation (overscreened). A description of screening status definitions can be found in Appendix B.

Apart from the increase in women with a previous annual screen (screened), there are two notable observations from these data. First, approximately 8-11% of women screened each year were previously unscreened, which is similar to the percentage of new patients reported by British Columbia (8.8%) in 2000 (Cervical Cancer Screening Program, 2002). Second, the proportion of women overscreened and possibly overscreened has decreased over time (Figure 16). This finding is relevant as it means that the province's Pap screening resources are being used more efficiently and that targeted education for both women and health professionals on the appropriate use of Pap screening appears to have had an impact.

Pap screening participation rates by age

Pap screening is strongly associated with age (Table 11; Figure 17), ranging annually from a high of 64% among 25-29 year olds to 10% or less among those 75 and older. In general, rates are highest among women in their reproductive years after which there is a period of decline. The actual extent of the decline is likely overestimated in Figure 17, as it would be expected that a proportion of women over the age of 50 would have had a full hysterectomy, in most cases eliminating the need for a Pap smear and removing them from the GCSP's target population.

[1]One should note that Prince Edward Island and British Columbia report on women aged 20-69, whereas Nova Scotia reports on women aged 15-90+

Figure 17. Percentage of women screened, by age, Nova Scotia 2001

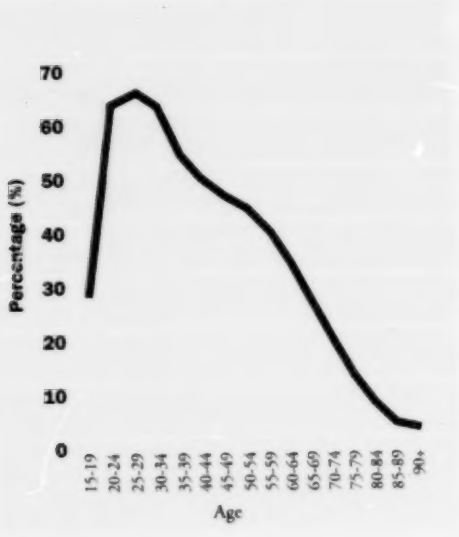


Table 11. Percentage (%) of women screened annually, by age, Nova Scotia 1993-2001

Age	Year								
	1993	1994	1995	1996	1997	1998	1999	2000	2001
15 - 19	31.7	29.1	30.1	29.5	27.9	27.5	26.4	25.4	26.4
20 - 24	62.8	57.1	60.5	59.0	57.6	56.7	56.1	55.8	60.1
25 - 29	63.3	57.8	61.6	62.0	61.3	60.9	60.0	58.8	63.7
30 - 34	55.5	51.8	55.2	56.6	55.5	55.9	56.4	56.6	60.4
35 - 39	45.7	42.2	46.9	48.0	48.4	50.0	50.1	51.2	52.6
40 - 44	39.6	37.4	41.2	42.1	43.6	44.7	46.1	46.8	47.9
45 - 49	37.8	35.7	39.5	40.6	41.6	42.1	43.0	43.1	44.8
50 - 54	34.3	32.3	36.7	38.4	40.0	40.9	41.8	41.8	41.8
55 - 59	27.6	27.7	31.5	33.2	35.8	36.1	37.8	37.4	38.5
60 - 64	22.6	22.0	24.9	26.9	28.3	30.2	32.0	32.4	32.2
65 - 69	17.3	17.0	19.5	21.0	23.1	23.7	25.2	25.2	25.1
70 - 74	11.9	11.6	13.2	14.5	15.9	16.3	17.0	17.4	17.5
75 - 79	8.1	7.3	8.7	9.5	9.9	10.3	10.9	11.3	10.6
80 - 84	4.1	4.0	4.6	5.2	5.2	5.1	5.8	5.8	5.8
85 - 89	1.9	2.1	2.3	2.6	2.7	2.7	3.0	2.4	2.5
90+	1.5	1.8	1.3	1.5	1.3	1.1	1.5	1.6	1.3

While it is younger women who are most likely to have a Pap smear, older women account for the largest gains in screening participation rates between 1993 and 2001 (Figure 18). In fact, the average annual percentage change was negative among women younger than 30, with the largest declines occurring for those aged between 15 and 19 years (-2.4%). However, the primary goal at this young age involves education and the establishment of health care practices that will lay the foundation for a healthy future. Women of all other ages experienced some level of growth, with women between the ages of 55 and 84 years having the largest average annual percentage increases, ranging from 4.3% to 5.6%.

The annual growth among older women has shifted the median age of those being screened each year upward. In 1993, half the women screened were aged 33 and older, whereas in 2001 the median had increased such that half were aged 39 and older. This increase in age is greater than what would be expected from the natural aging of Nova Scotia's population.

Figure 18. Average annual percent change (AAPC) in Pap screening participation rates, by age, Nova Scotia 1993-2001. A 95% confidence interval (⊢—) is presented for each estimate.

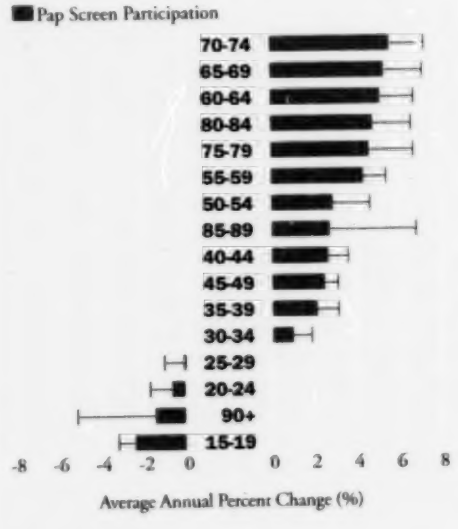


Table 12. Annual age-standardized Pap screening participation rates[1] in women aged 15+, by county, Nova Scotia 1993-2001

County	Year								
	1993	1994	1995	1996	1997	1998	1999	2000	2001
Annapolis	35.5	39.2	39.7	41.4	41.1	41.0	39.8	40.6	40.4
Antigonish	39.4	39.1	38.9	41.5	42.5	42.5	43.8	44.6	45.1
Cape Breton	30.8	32.5	32.5	32.8	34.9	36.8	36.9	35.9	38.3
Colchester	34.0	30.2	35.0	35.2	36.5	37.2	37.8	38.6	40.5
Cumberland	38.3	33.0	34.9	36.3	34.8	33.2	35.1	34.2	36.7
Digby	39.1	38.5	40.5	42.4	41.7	41.9	41.1	40.0	44.6
Guysborough	36.7	38.2	36.1	41.7	38.4	41.5	41.5	42.5	47.5
Halifax	40.9	36.5	42.2	42.7	42.6	42.5	42.9	43.0	43.3
Hants	46.3	40.9	46.3	47.2	47.0	47.1	46.2	45.4	48.5
Inverness	30.0	30.0	30.5	31.2	32.6	33.8	34.1	31.7	35.7
Kings	37.6	38.3	39.1	40.5	40.2	40.7	40.4	40.3	43.1
Lunenburg	39.7	39.4	41.3	41.2	41.6	41.9	42.1	43.2	45.8
Pictou	37.5	39.2	38.6	39.0	39.8	39.5	40.0	40.2	43.7
Queens	37.2	36.4	38.0	38.6	40.8	42.5	41.3	42.6	45.1
Richmond	37.4	38.1	38.4	36.8	36.9	39.5	40.7	38.9	41.4
Shelburne	27.7	27.5	28.8	29.3	29.6	29.0	31.3	31.6	36.5
Victoria	32.1	26.8	30.7	31.8	31.3	33.2	33.6	35.8	38.2
Yarmouth	37.8	39.0	39.5	41.4	40.4	40.8	42.9	44.3	46.4
All Nova Scotia[2]	**40.2**	**37.4**	**40.7**	**41.4**	**41.7**	**42.1**	**42.5**	**42.8**	**44.4**

[1] Rates are standardized to the age distribution of the 1991 Canadian population
[2] Nova Scotia totals include approximately 4% of women for whom a county could not be assigned

Figure 19. Average annual percent change (AAPC) in Pap screening participation rates for women aged 15+, by county, Nova Scotia 1993-2001. A 95% confidence interval (⊢—) is presented for each estimate.

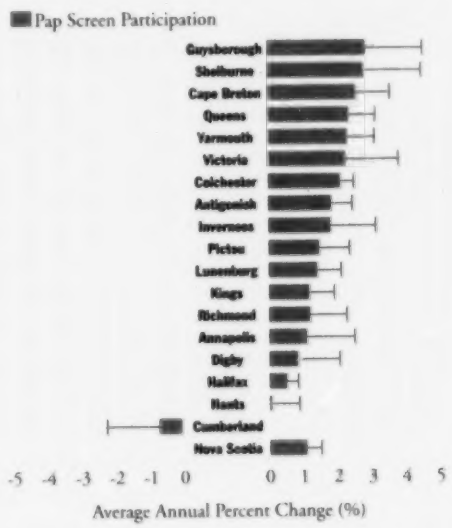
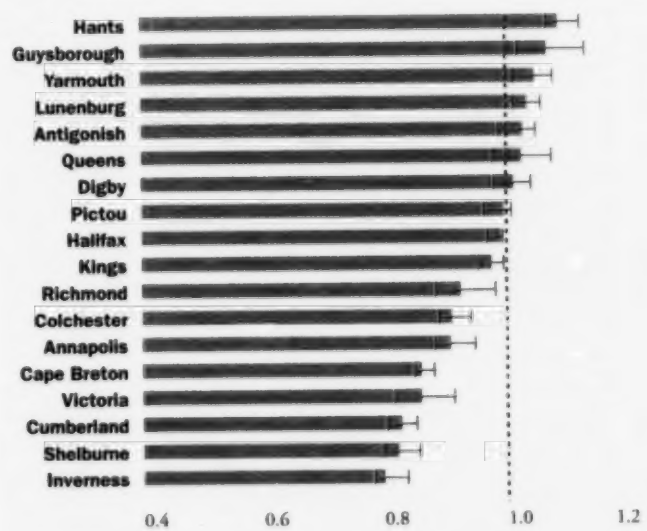


Figure 20. Comparative Pap screening participation figures (CPSPF) based on age-standardized participation rates[1], comparing county to provincial level estimate, Nova Scotia 2001. A Pap participation rate in a given county varies significantly from that of the province if the 95% confidence interval (⊢—⊣) of the CPSPF value ( )does not cross the dotted black reference line (ie. the Nova Scotia estimate).



[1] Rates are standardized to the age distribution of the 1991 Canadian population

Figure 21. Average annual percent change (AAPC) in Pap screening participation rates for women aged 15+, by district health authority, Nova Scotia 1993-2001. A 95% confidence interval (⊢—) is presented for each estimate.

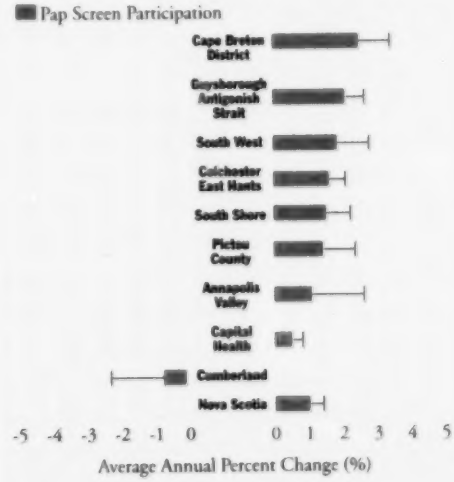


Table 13. Annual age-standardized Pap screening participation rates[1] in women aged 15+, by district health authority, Nova Scotia 1993-2001

District Health Authority	Year								
	1993	1994	1995	1996	1997	1998	1999	2000	2001
South Shore Health	39.1	38.7	40.6	40.7	41.4	42.0	41.9	43.1	45.7
South West Health	35.6	35.9	37.1	38.6	38.0	38.1	39.3	39.7	43.3
Annapolis Valley Health	37.1	38.5	39.2	40.8	40.4	40.8	40.3	40.3	42.4
Colchester East Hants Health Authority	36.6	32.7[2]	37.6	38.2	39.0	39.7	39.9	40.4	42.5
Cumberland Health Authority	38.3	33.0[2]	34.9	36.3	34.8	33.2	35.1	34.2	36.7
Pictou County Health Authority	37.5	39.2	38.6	39.0	39.8	39.5	40.0	40.2	43.7
Guysborough Antigonish Strait Health Authority	37.1	37.7	37.4	39.5	39.4	41.0	41.6	41.7	44.1
Cape Breton District Health Authority	30.7	31.7	32.1	32.4	34.3	36.0	36.2	35.2	37.7
Capital Health	41.3	36.8[2]	42.5	43.0	42.9	42.8	43.1	43.1	43.6
All Nova Scotia[3]	**40.2**	**37.4**	**40.7**	**41.4**	**41.7**	**42.1**	**42.5**	**42.5**	**44.4**

[1] Rates are standardized to the age distribution of the 1991 Canadian population
[2] Rates lower than expected due to underreporting. See Data Quality in Appendix D
[3] Nova Scotia totals include approximately 4% of women for whom a district health authority could not be assigned

Pap screening participation rates by region

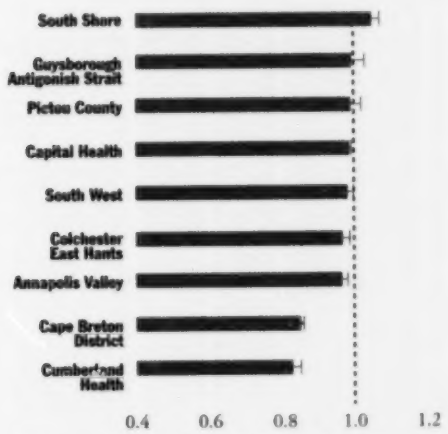
This section of the report details regional findings at two levels. First, in keeping with tradition, findings are reported for the 18 counties that comprise Nova Scotia. Second, findings are reported by the province's nine Distrct Health Authorities (DHA), which follow county lines for the most part, with the exception of Hants and Inverness counties, portions of which are found in more than one DHA (see Figure 7).

Table 12 shows age-standardized Pap screening participation rates for each of the counties between 1993 and 2001. Perusing the table, it appears there has been a gradual improvement in screening rates in most counties. In fact, Figure 19 shows quite clearly that all counties in Nova Scotia, with the exception of Cumberland County (-0.8%), have experienced an average annual increase in screening since 1993. Guysborough (2.9%), Shelburne (2.9%), and Cape Breton (2.7%) counties had the highest rates of average annual growth, whereas Digby, Halifax, and Hants counties had the slowest rates of growth, averaging less than 1%.

Figure 20 shows a comparison between annual age-standardized Pap screening participation rates for each county and that of the province for 2001. The graph reveals significant regional disparities in Pap screening participation rates. Of the 18 counties, more than half (10) fall below the provincial average (44.4%). Both Cape Breton and Victoria counties have rates of invasive cervical cancers higher than the provincial average and, also show Pap screening participation rates lower than those of the province as a whole (see Figures 8, 20). Overall, Cumberland (36.7%), Shelburne (36.5%), and Inverness (35.7%) had the lowest Pap screening participation rates. Only four counties had rates significantly higher than the provincial average, led by Hants (48.5%), Guysborough (47.5%), Yarmouth (46.4%), and Lunenburg (45.8%).

All DHAs on average, experienced some level of Pap screening growth between 1993 and 2001, with the exception of the Cumberland Health Authority (-0.8%; Table 13; Figure 21). Interestingly, the province's two largest DHAs were at opposite ends of the growth spectrum with Cape Breton District Health Authority (CBDHA) leading the province in growth (2.6%), and Capital Health (CH) having the lowest net gain (0.5%). The CBDHA growth is likely a result of focused efforts between 1997 and 2002 by the GCSP and Cape Bretoners to develop and implement effective screening strategies.

Figure 22. Comparative Pap screening participation figures (CPSPF) based on age-standardized participation rates[1], comparing district health authority to provincial level estimate, Nova Scotia 2001.
A Pap participation rate in a given district health authority varies significantly from that of the province if the 95% confidence interval (⊢⊣) of the CPSPF value (▬) does not cross the dotted black reference line (ie. the Nova Scotia estimate).



[1] Rates are standardized to the age distribution of the 1991 Canadian population

Figure 22 compares each DHA's annual age-standardized Pap screening participation rate with the provincial average for 2001. The results show that annual age-standardized Pap participation rates for most DHAs fall below the provincial average (44.4%), underscoring the need for province-wide improvement. Only South Shore Health (45.7%) had a higher rate. Guysborough Antigonish Strait Health Authority (44.1%) and Pictou County Health Authority (43.7%) had rates similar to the provincial average, whereas the remaining DHAs all had rates below the provincial average with CBDHA (37.7%) and Cumberland Health Authority (36.7%) having the lowest.

Cytology results

There were seven laboratories performing gynaecological cytology in Nova Scotia in 2001. The PCCR receives data electronically from three labs and four labs send in paper copies of report forms. All labs participate in the GCSP quality assurance activities and provide a high level of quality service to their communities.

The province's seven cytology labs processed more than 176,000 Pap smears in 2001 for the 159,338 women who had a Pap smear. This translates into an average of 1.1 smears for every woman screened. This number represents a 6% increase from 1993 (165,900). Table 14 shows the number of Pap smears processed by each of the province's labs over the reporting period. The numbers indicate that the rate of growth has been reasonably uniform across all labs. The numbers also indicate that the QEII/CH lab accounts for most (60%) of the Pap smears processed in the province each year.

Results of Pap smears performed in the province between 1993 and 2001 are shown

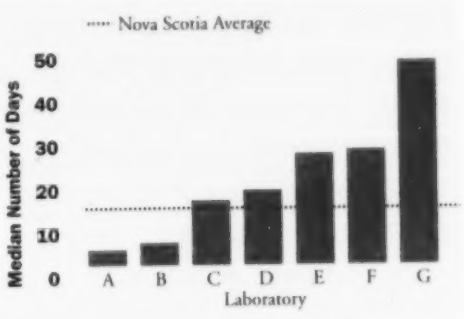
Table 14. Number of Pap smears processed annually by laboratory, Nova Scotia 1993-2001

Year	Laboratory						
	Aberdeen	St. Martha's	QEII[1]	Yarmouth	Valley[2]	Cape Breton	South Shore
1993	7,193	7,852	102,928	7,340	14,939	16,596	8,672
1994	7,921	8,010	87,288[3]	7,520	15,070	17,892	8,767
1995	7,567	7,971	100,316[3]	7,459	15,302	17,864	9,357
1996	7,587	8,504	101,466	8,124	16,151	17,422	9,527
1997	7,571	8,573	99,882	8,038	16,015	18,521	9,799
1998	7,336	8,881	100,521	8,113	15,846	19,523	10,129
1999	7,601	8,608	103,252	9,271	14,549	19,892	10,452
2000	7,760	9,304	105,567	9,669	14,542	18,418	10,692
2001	7,687	9,282	105,141	10,145	14,212	18,697	11,482

[1] QEII includes the Halifax Infirmary and the Victoria General Hospital
[2] Valley includes Soldiers Memorial Hospital
[3] Underreporting for data for the QEII in 1994 and 1995. See data quality in Appendix D

in Table 15. The percentage of Pap smears interpreted as being negative has remained relatively stable over the period 1993 through 2001 at about 94.5%. The unsatisfactory Pap smear rate in the province has remained low at less than one half of 1%, likely reflecting good attention to the technique of performing, fixing, transporting, and interpreting Pap smears. Although the overall percentage of abnormal Pap smears has not changed significantly over time, more abnormal Pap smears detected in 2001 show atypical squamous cells of undetermined significance rather than low grade or high grade squamous intraepithelial lesions, possibly reflecting earlier detection of pre-cancerous cervical abnormalities.

Figure 23. Median Pap smear turnaround time by laboratory, Nova Scotia 2001



Specimen turnaround time

The amount of time it takes for a laboratory to process and report the results of a test is one of many quality control indicators whereby labs measure their performance. Labs constantly strive for high quality services with reasonable turnaround times. Timely service reduces delays in patient follow-up, which benefits both the lab and the patient.

There have been a number of mergers of the province's cytology labs over the study period, which precludes a fair assessment of trends that would indicate each lab's ability to improve turnaround times. Figure 23 shows the turnaround times for the province's seven cytology laboratories and the provincial average for 2001. Averages are expressed in terms of median time, that is the value at which half of the turnaround times are above and half are below, making the times reported less sensitive to the existence of extreme values. The data show that there are considerable differences between the seven cytology labs, with median turnaround times ranging from 3-1/2 days to 47 days. Two labs are turning results around within one week, which is faster than the provincial average of 13 days. All but one lab had turnaround times within the 30-day standard proposed by British Columbia's Cervical Cancer Screening Program (Cervical Cancer Screening Program, 2002).

Table 15. Percent distribution of cytology diagnoses, Nova Scotia 1993-2001

The Bethesda System	Year								
	1993	1994	1995	1996	1997	1998	1999	2000	2001
Unsatisfactory	0.5	0.6	0.5	0.3	0.3	0.2	0.3	0.5	0.4
Negative	94.8	95.0	95.6	96.2	97.0	96.6	96.2	95.4	94.5
Atypical Squamous Cells of Undetermined Significance	1.5	1.5	1.6	1.4	1.1	1.7	1.9	2.1	2.8
Low Grade Squamous Intraepithelial Lesion	1.8	1.7	1.4	1.2	0.8	0.8	0.9	1.1	1.3
High Grade Squamous Intraepithelial Lesion	1.2	1.0	0.8	0.7	0.5	0.6	0.6	0.6	0.7
Carcinoma - Squamous	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Atypical Glandular Cells of Undetermined Significance	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2
Adenocarcinoma-in-Situ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Carcinoma - Adenocarcinoma	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Vaginal Intraepithelial Neoplasia	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

... control efforts are aimed at ... programs that produce improvements in cancer outcomes. Women in Nova Scotia have benefited from organized programs directed at the management of gynaecological malignancies. Providing state-of-the-art treatment modalities, implementing population-based screening along with targeted education strategies, are some primary activities that have led to these benefits.

This report presents a portrait of gynaecological cancer in Nova Scotia and demonstrates how system changes adopted over the past 30 years have resulted in improved outcomes. Equally important in the findings, are directions that have been identified for future program enhancements.

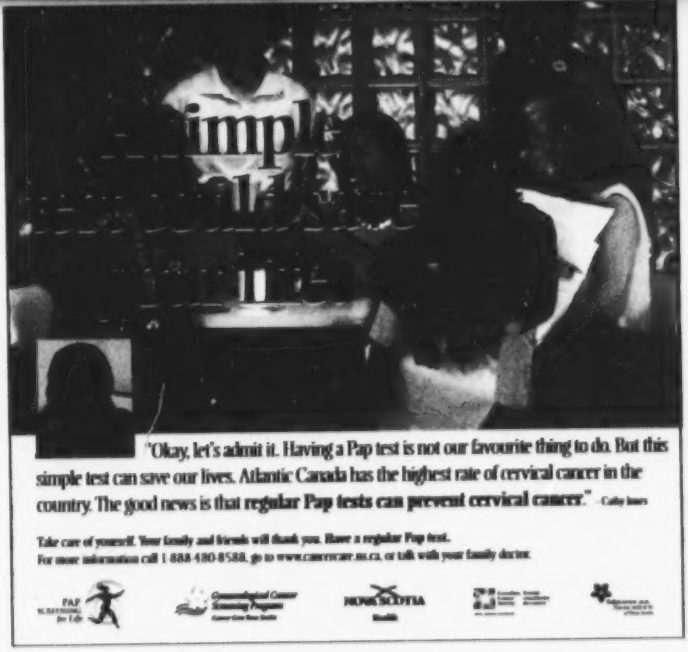
Nova Scotia has experienced a significant reduction in mortality of both cervical and ovarian cancers, with the rates dropping 60% and 39% respectively, between 1971-2001. In addition, the incidence rate of cervical cancer has declined 52% over the same time period. This reduction in incidence is largely attributable to effective screening efforts for cervical cancer.

Over 1,300 women were diagnosed and nearly 500 died of some form of gynaecological cancer between 1997-2001. Cervical, ovarian and uterine cancers account for 94% of these newly diagnosed cancers. Seventy-five per cent of women diagnosed were 50 years of age and older.

Cancer incidence varies not only by age and over time, but also by region. Cape Breton and Victoria counties showed age-standardized incidence rates of cervical cancer higher than the provincial average, while Kings County had a lower rate. The incidence of ovarian and uterine cancers was largely similar throughout the province, with the exception of Yarmouth County for which the rate of ovarian cancer was lower; and of Richmond for which the rate of uterine cancer was noticeably higher than the provincial average.

The population of Nova Scotia is aging and as a result, the number of new cancer cases is rising. By 2010, the incidence of invasive ovarian and uterine cancers is expected to increase by 34% and 37% respectively, relative to 2001. In contrast, cervical cancer is expected to decrease 8%, despite the growing population at risk. This anticipated reduction results from past and on-going efforts to detect the disease early, when treatment is most effective.

Nonetheless, the rate of cervical cancer remains among the highest in the country. Twenty women die of cervical cancer each year in Nova Scotia, resulting in over 500 years of life lost prematurely. Most of these deaths could have been prevented through regular Pap screening and management of abnormalities.


"Okay, let's admit it. Having a Pap test is not our favourite thing to do. But this simple test can save our lives. Atlantic Canada has the highest rate of cervical cancer in the country. The good news is that regular Pap tests can prevent cervical cancer."
Take care of yourself. Your family and friends will thank you. Have a regular Pap test.
For more information call 1 888 480 8588, go to www.cancercare.ns.ca, or talk with your family doctor.

In 2001, nearly 160,000 women aged 15 years and older were screened in Nova Scotia, representing an annual Pap screening participation rate of 41%. Over the past nine years, Nova Scotia has averaged an annual growth of almost 1% in Pap screening participation rate, resulting in 1,200 additional women being screened from the previous year. Some of this increase is occurring through population aging (i.e. young women joining the 'at risk' population), some through population growth.

Annual growth in Pap screening participation rates varies by age and region. Compared to the 1% provincial annual growth rate, women aged 55 and older experienced a 5% annual growth rate between 1993-2001. During this same time period, 3% annual growth in the Pap screening participation rate was observed in women (all ages combined) from Guysborough, Shelburne and Cape Breton counties.

Research examining barriers to screening experienced by older women and women from the above mentioned counties, led to the development of targeted interventions, including: Well Woman Clinics, public and professional education campaigns and specialized training of nurses to provide Pap smears. Increases in Pap screening participation rates noted above, indicate these interventions have achieved a degree of success.

Observed annual growth in Pap screening participation rates is encouraging. However, the three-year (1999-2001), 65% provincial screening rate measured for all age groups combined remains below the GCSP target of 85% screening within a three-year period.

Report findings demonstrate that some groups of women remain harder to reach than other segments of the population, and disparities appear to be deep-rooted. For example, Pap screening participation rates in Shelburne and Cape Breton counties have always been among the lowest in the province. This situation continues today, despite significant increases in participation recorded in these areas for recent years.

Issues and challenges have been identified for cervical cancer screening in Nova Scotia. The GCSP is currently involved with a number of educational campaigns and interventions aimed at promoting Pap screening. These include: Pap Test Awareness Week, Provider Practice Profiles, Cervical Health Curriculum for Grade 9 students, Quality Report Cards, Lay Educators and nurse provider Well Woman Clinics.

Combined efforts between two key units of *Cancer Care Nova Scotia* — the Gynaecological Cancer Screening Program and the Surveillance and Epidemiology Unit — have been successful in providing new and updated information for the management of gynaecological cancers in Nova Scotia. This report can be a valuable resource to stakeholders, including the women of Nova Scotia, to address cancer control issues related to these diseases.

Summary

Cancer control efforts are aimed at **developing programs** that produce **improvements in cancer** outcomes. **Women in Nova Scotia** have benefited **from organized** programs directed at the management of gynaecological malignancies. Providing state-of-the-art treatment modalities, implementing population-based screening along with targeted education strategies, are some primary activities that have led to these benefits.

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NOVA SCOTIA

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Glossary

Age The specific age at which a cancer is diagnosed (incidence) or at which a cancer death (mortality) occurs.

Age distribution See age structure.

Age-specific incidence count The number of new cases of cancer diagnosed during a period of time for a specified age-range. Five and ten year age groups are commonly used.

Age-specific incidence rate The ratio of age-specific incidence count to the population size from which the counts were derived. It is usually expressed as a rate, in units of: per 100,000 persons per year for a specified age range.

Age-specific mortality count The number of deaths (due to cancer) for a specified age range. Five and ten year age groups are commonly used.

Age-specific mortality rate The ratio of age-specific mortality count to the population size of a specified age range from which the counts were derived. It is usually expressed as a rate, in units of: per 100,000 persons per year, for a specified age range.

Age standardization The adjustment of a quantity (e.g., cancer incidence or mortality rates) to reflect the age structure of a reference population, allowing meaningful comparisons over time and between geographic areas. The age structure of all of Canada (from the 1991 population) was used as a standard (reference point) to facilitate comparisons with other regions of Canada.

Age-standardized Pap screening participation rates Pap participation rates standardized to the reference state of the 1991 Canadian age-distribution. As Pap screening is strongly associated with age, Pap screening participation rates must be adjusted to impose a similar age structure on the population of interest to allow the comparison of rates between geographical regions and over time. See also, age standardization.

Age-standardized incidence rates Cancer incidence rates standardized to the reference state of the 1991 Canadian age-distribution. As cancer is more common in older people, a population that is older will show higher cancer incidence rates than one composed of younger individuals. Age-standardized incidence rates are calculated to allow the comparison of cancer rates between geographical areas and over time. See also, age standardization.

Age-standardized mortality rates Cancer mortality rates standardized to the reference state of the 1991 Canadian age-distribution. As cancer mortality rates vary strongly with age, mortality rates must be adjusted to allow their comparison between geographical areas and over time. See also, age standardization.

Age structure The frequency distribution (i.e., number) of people in a population as a function of their age.

Average annual percent change The rate of change observed in a trend, expressed as a percent increase or decrease, and averaged over a specified time period.

Bethesda system An accepted North American classification system for reporting results of cervical cytology.

Cancer incidence count The number of new cases of cancer diagnosed during a period of time.

Cancer incidence rate The ratio of the cancer incidence count to the population size from which the counts were derived (unadjusted for age-structure). It is usually expressed as a rate, in units of: per 100,000 persons per year. Also referred to as the 'crude incidence rate'.

Cancer mortality count The number of deaths due to cancer.

Cancer mortality rate The ratio of the cancer mortality count to the population size from which the counts were derived (unadjusted for age-structure). It is usually expressed as a rate, in units of: per 100,000 persons per year. Also referred to as the 'crude mortality rate'.

Cancer prevalence The number of people who are currently living with cancer. In this report, estimates include all Nova Scotia residents known to be alive and diagnosed with invasive cancer within the preceding 15 years.

Colposcopy A microscopic examination of the cervix performed for the diagnosis of cervical abnormalities.

Comparative incidence figure (CIF) The ratio of the age-standardized incidence rate of a given tumour site (e.g., cervix) in a specific geographical area (e.g., a county or a District Health Authority, DHA) relative to that of the whole of Nova Scotia. A CIF less than one indicates incidence rates that are less than the provincial average, while a CIF greater than one indicates higher rates of cancer incidence than the provincial average.

Comparative Pap screening participation figure (CPSPF) The ratio of the age-standardized Pap screening rate recorded in a specific geographical area (e.g., a county or a District Health Authority, DHA) relative to that of the whole of Nova Scotia. A CPSPF less than one indicates screening rates that are less than the provincial average, while a CPSPF greater than one indicates higher rates of screening than the provincial average.

Confidence interval (CI) The numerical range within which a value is expected to fall with a given probability (expressed as a percentage; e.g., 95% CI).

Confounder A characteristic that could alter a person's risk of disease and be related to the risk factor under study.

Cytology Diagnostic procedure based on the study of cells using a microscope. An example of this procedure is the Pap smear, used to detect cells that may lead to cervical cancer.

District health authorities (DHAs) Organizational units, defined by the provincial Department of Health, that integrate the delivery of health care services. DHAs govern, plan, manage, deliver, monitor, evaluate and fund the health services devolved to them. There are nine DHAs in Nova Scotia whose boundaries more or less mirror the already established county, or municipal lines (in some cases more than one county; see Figure 7).

Etiology Cause(s).

Five-year relative survival rate The probability of living beyond the first five years after being diagnosed with a primary invasive cancer, relative to that of members of the general population who have the same characteristics, such as age, gender, and province of residence, as the cancer patients.

Invasive cancer The uncontrolled growth of normal cells resulting in the formation of a malignant tumour that invades underlying tissues. Can be a primary or secondary cancer.

Lead-time bias An apparent, but not real, increase in survival can occur due to the detection of a disease at its preclinical stage (asymptomatic). This may result from the introduction of a screening program and/or increased sophistication of diagnostic methods. An apparent increased survival time for those patients can result from a knowledge of the disease for a longer period of time due to its early detection, rather than a true longer survival time.

Length bias Persons affected by slowly progressing disease have a longer preclinical stage (asymptomatic period) and are therefore more likely to be identified by a screen. When a screening program is introduced, it will detect a larger proportion of less aggressive cases who typically experience longer survival. This will create a bias of increased survival, particularly in the early years post-introduction of a screening program.

Logarithmic transformation A mathematical procedure applied to data that reduces the influence of extreme values and so increases the relative "normality" of data and therefore the reliability of statistical tests.

Median The value found in the middle of an ordered distribution (i.e. half the values are above the median and half the values are below the median).

Pap smear or Papanicolaou screening test A microscopic examination of cells scraped from the cervix that can detect cancerous or precancerous conditions, which would require histological confirmation of the presence or absence of disease.
Normal smear A normal smear indicates that no abnormal cells are present on a smear sample.
Abnormal smear An abnormal smear indicates cell changes that range from an inflammatory atypia to malignancy.

Primary cancer A malignant tumour confined to the organ of origin (also, see secondary cancer).

PYLL The number of potential years of life lost due to the premature mortality of an individual.

Screening Screening is a way to find out which people in the population are likely to have a disease or condition as compared with those who probably do not. There are many tests available to screen for conditions as part of preventive health measures such as Pap smear and mammogram.

Secondary cancer A malignant tumour that has spread (metastasized) to parts of the body remote from the primary site (also, see primary cancer).

Staging Classification of spread of disease, typically at time of diagnosis.

Standard population A reference population that is used to standardize measurements and indices. In the context of this report, the population age structure or distribution of the whole of Canada as it was in 1991 is used as this standard population. See also, age standardization.

Survival rate The proportion of people diagnosed with cancer who are still alive after a given period of time, most commonly one, five or ten years after diagnosis. Also referred to as the 'crude survival rate'.

Appendix A

Cancer Registry: data sources, quality, confidentiality and processing

Data sources

All cases of cancer diagnosed in the province of Nova Scotia must be legally reported (Office of the Legislative Counsel, 1989) to the Surveillance and Epidemiology Unit (SEU) of *Cancer Care Nova Scotia*, the group that manages the Cancer Registry. This information is obtained from the following sources:

Pathology reports
Provincial Pathology Laboratories

Registry report forms
Hospital Health Record Departments or Physician Offices

Cancer Centre referrals
Electronic records of patients referred to provincial Cancer Centres

Death certificates
Nova Scotia Vital Statistics

Reciprocal notifications
Other Canadian Registries

Demographic information about the individuals and the nature of their cancer(s)[1] are recorded. All primary tumour sites and death cases are coded in accordance with the International Classification of Diseases (ICD, World Health Organization, see Table A1).

Data quality

Data quality and accuracy is ensured through a network of activities including automated and manual edit processes, record linkages and data audits. SEU operations are in accordance with the cancer registration standards of both the Canadian Cancer Registry (CCR) and the North American Association of Central Cancer Registries (NAACCR). The SEU is also a member of the International Association of Cancer Registries (IACR), which fosters the international exchange of information between cancer registries.

Data quality indicators for the three main gynaecological cancers diagnosed between 1997-2001, show that on average, more than 95% of cancer cases have been confirmed through pathology and less than 2% are detected only at death (Table A2). The mortality to incidence ratios (deaths/diagnoses) are similar to those reported in other Canadian provinces (see National Cancer Institute of Canada 2003), and tend to be higher for ovarian cancer, a tumour site with poor prognosis relative to uterine or cervical cancers.

Data confidentiality

The maintenance of data confidentiality is a guiding principle for all SEU operations. Strict guidelines govern data access and handling from the initial registration of a case through to research and reporting. Only qualified SEU staff, operating within security guidelines, have access to Cancer Registry records. To ensure the continued anonymity of the persons followed by the SEU, age-specific and site-specific cancer summaries are not presented when counts are below five cases. The Research Ethics Board of Capital Health must approve all research studies undertaken by the SEU.

[1] An individual may be diagnosed with more than one cancer in their lifetime.

Data processing

Cancer incidence records for selected gynaecological tumour sites (cervix, ovary, uterus, vagina and vulva) were extracted from the Oncology Patient Information System (OPIS) database and studied by age groups, geography and over time, with the most recent complete data being available for the calendar year 2001. Cancer mortality records were obtained from the provincial registrar of vital statistics. Population counts were obtained from Statistics Canada for the period of 1971-1996 and from postcensal estimates for the period of 1997-2001. At the time the report was initiated, 2001 population data, corrected with adjustment for ascertainment, were not available.

Cancer incidence and mortality rates are presented at the county, DHA and provincial levels as well as over time (1971-2001). Rates were age-standardized (see Glossary) to allow meaningful comparisons of cancer rates over time and between geographic regions. The direct method was used in this report to compute age-standardized rates. The standard population used was that of the whole of Canada, as it was in 1991.

The majority of detailed analysis was conducted after pooling data over a five-year time period (1997-2001)[1] to reduce problems associated with the computation of small numbers. This approach was essential to provide a reliable and stable profile of cancer incidence, mortality and survival in the province. Variance estimates (and 95% confidence intervals) were calculated assuming the age-specific counts were random Poisson events (e.g., in the calculation of age-standardized incidence and mortality rates—ASIR and ASMR, respectively).

The number of potential person-years of life lost (PYLL) was calculated by obtaining the number of deaths for ages, 15-19, 20-24, 25-29, … 90+ recorded for Nova Scotia in 2001 and the life expectancy at the

Table A1. International Classification of Disease (ICD) codes used for the classification of gynaecological cancers

Cancer Site	ICD-8[1]	ICD-9[2], ICD-0[3]	ICD-10[4], ICD-02[5], ICD-03[6]
Cervix	180	180	C53
Body of Uterus	182	179 182	C54 C55
Ovary	183	183	C56 C57
Vagina	1840	1840	C52
Vulva	1841-1844	1841-1844	C51

[1] ICD-8, used for coding both incidence and death cases between 1971-1978 and refers to the Eighth Revision of the International Classification of Diseases
[2] ICD-9, used for coding death cases between 1979-1999 and refers to the Ninth Revision of the International Classification of Diseases
[3] ICD-O, used for coding incidence cases between 1979-1991 and refers to the International Classification of Diseases for Oncology
[4] ICD-10, used for coding death cases as of 2000 and refers to the Tenth Revision of the International Classification of Diseases
[5] ICD-O2 used for coding incidence cases between 1992-2000 and refers to the Second Revision of the International Classification of Diseases for Oncology
[6] ICD-O3 used for coding incidence cases as of 2001 and refers to the Third Revision of the International Classification of Diseases for Oncology

Table A2. Data quality indicators for selected gynaecological cancers, Nova Scotia 1997-2001

	Proportion of cases confirmed microscopically (%)[1]					Proportion of cases confirmed with a Death Certificate Only (% DCO[2])					Mortality/Incidence Ratio (%)[3]				
Cancer Site	**1997**	**1998**	**1999**	**2000**	**2001**	**1997**	**1998**	**1999**	**2000**	**2001**	**1997**	**1998**	**1999**	**2000**	**2001**
Cervix	100.0	98.0	98.3	100.0	98.3	0.0	2.0	0.0	0.0	1.7	52.4	40.8	27.1	25.6	31.7
Body of Uterus	100.0	96.5	97.4	95.7	99.1	0.0	0.0	2.6	1.7	0.9	23.7	28.7	13.8	17.9	19.0
Ovary	94.8	94.2	89.5	91.7	88.6	3.9	1.0	3.2	0.0	1.4	58.4	38.5	49.5	60.7	65.7

[1] A high proportion (%) of microscopic confirmation indicates that figures are not overestimates of cancer incidence
[2] The proportion of DCO cases is recommended to be < 5% by the Canadian Cancer Registry. A high % of DCO cases may indicate inadequate cancer registration processes
[3] The mortality / incidence ratio is expected to be <100% and tends to be higher for cancer sites with poor survival

[1] However, time trends in cancer incidence and mortality elapsed over a larger time period (1971-2001); incidence trends by disease stage and relative survival estimates focused on the period 1992-2001 due to the unavailability of staging information prior to 1992; projection estimates of cancer incidence used the period 1986-2001

midpoints of the age groups as listed in the Nova Scotia 1996 life tables. The PYLL is obtained by multiplying, for each age group, the number of deaths by the remaining life years of survivors (see National Cancer Institute of Canada 2003).

Comparative incidence figures (CIF) were derived from the ratio of the average annual (1997-2001) ASIR for a given cancer type recorded in a specific geographical area (i.e., a county or a DHA) to the average annual ASIR for that same cancer type for the whole of Nova Scotia. The computation of the 95% confidence intervals followed the methodology described by Breslow and Day (1980).

An average annual percent change (AAPC) was calculated for the period 1992-2001 by fitting a generalized linear regression model with errors following a Poisson distribution to the logarithmically transformed ASIR. This model was retained over the more commonly used unweighted least squares regression model due to the rarity of the events treated in this report (i.e., gynaecological cancer incidences). The slope resulting from the fit was back-transformed and expressed as a percent increase or decrease in the rate of cancer incidence over the 1992-2001 period.

Projections of cancer incidence rates for the years 2005 and 2010 were computed from a weighted least squares regression model, where the weights were the inverse of the estimated variances of the actual age-standardized rates (see details in National Cancer Institute of Canada 2001). Projections of cancer incidence counts were extrapolated from a linear regression of the time trends and variance estimates obtained assuming a Poisson process. One should note that projection estimates computed for gynaecological tumour sites are based on a relatively small number of events: gynaecological tumours account for approximately 12% of all cancer incidences and the population of Nova Scotia is small at less than 360,000 women aged 15+. Therefore, the extrapolation of time trends is prone to increased chance variation, making long term prediction less reliable.

Relative survival analyses were conducted by tumour type and stage[1] (a measure of how far a cancer has spread in the body) at the time of diagnosis, a factor that is strongly associated with the survival of cancer patients. Analyses were based on the complete Hakulinen method (Hakulinen 1982) for women diagnosed with invasive primary cancer between 1992-2001. Because 2001 was the most recent complete year of data, only those women diagnosed prior to 1998 contributed to the 5-year relative survival estimates. Analyses focused upon the dominant gynaecological sites: cervix, ovary and uterus. If a woman was diagnosed with more than one invasive tumour between 1992-2001, only the record with the earliest date of diagnosis was retained for analysis (see Ellison and Gibbons 2001). Finally, reliable dates of diagnosis were unavailable for women diagnosed through autopsy or death certificate only (DCO). The exclusion of these cases, while necessary, slightly biases the survival rates presented in this report (e.g., Berrino et al. 1995).

Relative survival estimates compare the observed survival for a group of cancer patients to the survival that would be expected for members of the general population who have the same characteristics — gender, age group, and province of residence — as the cancer patients (see Ellison and Gibbons 2001). Observed survival time was calculated as the difference in days between the date of diagnosis and the date of last observation (date of death or December 31, 2001,

[1] Staging information is based on laboratory, radiological, clinical and surgical assessments that describe the extent of the primary tumour and evidence of metastases at diagnosis.

whichever was earliest) to a maximum of five years. Expected survival time was derived for each age, up to 86 years of age, from gender-specific provincial life tables provided by Statistics Canada. Using the method suggested by Dickman et al. (1998), these life tables were extended to age 99. Thus, if the five-year survivorship was 65% for a group of cancer patients that would otherwise have had a 90% survivorship, the relative survival rate would be 72% (65/90) (see Fitzpatrick and Gavin 2001 for more details). That is, relative survival rates are greater than the observed (crude) rates, which do not account for increases in mortality with age. By convention, relative survival is called a 'rate', although it is a ratio of two percentages.

The relative survival estimates presented in this report account for age-specific differences in background mortality, but not for the influence of age on the prognosis of a cancer patient. That is, the rates presented were not age-standardized to a 'cancer patient population standard' such as that of the World Standard Cancer Population or the EUROCARE standard (see Coleman et al. 1999). This allowed the computation of relative survival estimates that more closely reflect the reality of cancer patient survival and treatment outcomes in Nova Scotia.

Finally, confidence intervals (CI) of relative survival were derived from an approximation of the formula of Greenwood (1926; as per Armitage and Berry 1985) to provide an indication of the precision associated with the calculated rates. This method accounts for the gradual reduction in sample size due to patient death.

The female population retained for the computation of relative survival estimates was also used to determine the relative excess risk (RER) in cancer mortality as predicted by the stage of a disease at the time of the diagnosis. This index is based on a regression model with a Poisson error structure fitted to individual data that includes age as a covariate (see Dickman 2003). In this analysis, cases diagnosed with a stage 1 reflect an 'early stage' category of diagnoses, whereas those cases diagnosed at stage 3 or 4 were combined to reflect a 'later stage'.

Appendix B

Screening status definitions

Screened A Pap smear performed on a woman who had a previous Pap smear in the time frame equal to or greater than 9 months but not greater than 18 months.

Follow-Up A Pap smear performed within 9 months of a previous smear on the recommendation of a health professional; also, any Pap smear done in colposcopy within 9 months of an abnormal Pap smear.

Overscreened A repeat Pap smear performed within 9 months of a previous smear, not attached to a recommended repeat or apparently associated with colposcopy (for an abnormal Pap smear).

Possibly Overscreened A Pap smear performed within 9 months of a previous smear, accompanied by information insufficient to determine whether the current Pap smear should be classified as Overscreened or Follow-up.

Underscreened A Pap smear performed on a woman where no record of a previous smear can be found in the Provincial Cytology/Colposcopy Registry (PCCR) in a time frame equal to or greater than 18 months but not greater than 10 years (120 months).

Unscreened A Pap smear performed on a woman where no record of a previous smear can be found in the PCCR or no smear found within the previous 10 years (120 months).

Appendix C

GCSP, achievements and endeavours 1997-2003

Effective organized population cancer screening programs have been identified to comprise several key elements, which circumscribe the activities and efforts of the Nova Scotia cervical screening program (Walton 1976; 1982, Task Force Report on Screening for Cancer of the Cervix 1989, Canadian Strategy for Cancer Control Screening Working Group report 2002):

A. Effective recruitment and recall

- The program is challenged to identify and reach high-risk and hard-to-reach women.
- Letters of invitation to unscreened and underscreened women have been piloted in one area of the province with uptake of 10% (Johnson et al., 2003).
- A further initiative combining letters to women and provider practice profiles is being developed.
- Screening status of Nova Scotia women is now being tracked in the recently upgraded information system.

B. Privacy legislation

- Nova Scotia's Department of Health (DOH) is currently drafting new privacy legislation; meetings have been held between DOH and the GCSP to ensure the appropriate application of the legislation within the screening program.

C. Public education

- GCSP develops, tests, publishes and distributes public education materials throughout the year, free of charge; they include brochures, posters, bookmarks, fact sheets, reminder stickers, and video tapes.
- 2003 will mark the seventh annual Pap Test Awareness Week (PTAW) in Nova Scotia; this is a public awareness campaign involving mailouts of public education material to health professionals (pharmacies, occupational health nurses, physicians) and other groups such as seniors and university students (in frosh kits); a print, radio, and television media blitz, encouragement and support for hosting of community-based well woman clinics and health fairs during the week; and a proclamation by NS Minister of Health; since 1999 Western Newfoundland, PEI, and Manitoba have adopted PTAW held during that same week in October as Nova Scotia.
- In conjunction with the NS Department of Education, GCSP will provide cervical health curriculum for Grade 9 students in September 2003; the material will be available as part of the Health, Personal Development and Relationships curriculum in all junior high schools across Nova Scotia; it consists of a binder, CD, package of instruments, and teacher resource video.
- Paid community lay educators were piloted in Cape Breton and the pilot is being further evaluated; numerous public education strategies have been developed and piloted by the community educators (e.g. cancer prevention bingo, smock with female anatomy).
- A kit of tools developed and piloted in Cape Breton between 1997 and 2000 can be found at *www.cancercare.ns.ca.*

D. Education of health care providers

- GCSP distributes *Screening for Cancer of the Cervix: An Office Manual for Health Professionals* to medical students, nursing

students, smear takers and others on request; the Program is currently distributing the 3rd edition of this manual that includes technique description as well as guidelines for screening in Nova Scotia (includes a laminated card for easy reference).
• Since 1996 the Provincial Cytology/Colposcopy Registry has generated physician reminder letters for significantly abnormal results; this process is a safety net for reminder processes already in place in physician offices; it is also a reminder to smear takers of the appropriate management guidelines for significant abnormalities.
• Quality report cards for nurse providers have been generated by the registry for some time; report cards for physicians will be generated and distributed in 2003.

E. Access to screening
• Guidelines for training, certification and recertification of specially trained nurses to do Pap smears have been developed in association with the College of Registered Nurses of Nova Scotia; a pilot of nurse providers was conducted in response to a needs assessment that indicated women preferred female providers (Cape Breton Pilot Project, Health Canada grant 1997-2000); to date there are over forty nurse providers in Nova Scotia.
• The GCSP allocates funds annually to support community based Well Woman Clinics; small grants are provided to rural women's groups on approval of appropriate application.

F. Quality
• Gynaecological cytology and histopathology laboratories participate voluntarily in the GCSP quality assurance (QA) activities; QA guidelines and activities are designed by participants of committees representing all labs and colposcopy sites in the province; QA activities includes regular site visits by the GCSP, reporting of QA results to the Program, and distribution by GCSP of annual reports to labs and colposcopists.
• Quality report cards are distributed for all smear takers and for Well Woman Clinics when identified to the program (see D above).
• Nova Scotia adopted the Bethesda Terminology for cytology in January 2003.

G. Monitoring and evaluation
• GCSP has produced three multi-year statistical reports since 1991.
• In 1995 the GCSP and SEU collaborated to conduct a case control study examining the screening histories of 440 NS women diagnosed with invasive cervical cancer; this study will be updated in 2003.

H. Capacity to modify screening standards
• The structure of the GCSP includes subcommittees with provincial representation for each program component (Cytology, Colposcopy, Histopathology, Education, Registry) and mandates to develop, review and recommend standards and guidelines; these recommendations are put forward to the GCSP Management Committee and, if approved to the *CCNS* Board of Directors.
• GCSP is currently reviewing and will make provincial recommendations on the following issues:
–screening frequency and upper age cut-off;
–the role of new technologies in cervical screening.

I. Computerized information system
• The provincial information system was instituted in Nova Scotia in 1978; an upgraded PCCR was implemented in January 2003 and now resides on the same server as the Cancer Registry. It is supported by the IT staff of Capital Health.
• The registry is collaborating with management and staff of the Nova Scotia Hospital Information System project to develop and implement electronic interfaces with all cytology and histopathology sites processing gynaecologic specimens.
• GCSP is a member of the Cervical Cancer

Prevention Network (CCPN), a committee of Health Canada; the Information Systems Working Group of that committee has developed a core data set with which we comply.

J. Resources

• Grant applications for research have been successful in the past.

K. Consumer perspective

• *CCNS* and GCSP place a high value on the consumer perspective; the *CCNS* Board, GCSP Management Committee and two subcommittees have consumer representation; in addition, the GCSP established a Regional Resource Network (RRN) in 1994, comprised of forty women and family physicians across Nova Scotia who liaise with other women in their communities (largely rural membership) to raise awareness about Pap test screening; the RRN is active throughout the year but especially so during PTAW.

• The GCSP maintains an ongoing collaboration with societies and non-governmental organizations such as the Canadian Cancer Society, Canadian Pensioners Concerned, and the Senior Citizen's Secretariat to benefit and learn from their consumer perspective.

Table C1. Timeline of gynaecological cancer screening efforts in Nova Scotia

1960	Medical Society of Nova Scotia recommends the establishment of the Uterine Cancer Detection Program
1961	Pap smear introduced in Nova Scotia
1975	Colposcopy introduced in Nova Scotia
1978	Central Cytology Registry established
1989	Provincial workshop marks the beginning of reorganized provincial cervical cancer screening program
1991	Government of Nova Scotia recognizes the Nova Scotia Gynaecological Cancer Screening Program as a fully-funded provincial program
1995	First Case-Control Study of Pap smear effectiveness in Nova Scotia
1996	'Letters to Doctors' intervention to follow-up abnormal smears initiated
1997	Pap Test Awareness Week initiated
1998/99	'Letters to Cape Breton Women' intervention initiated
1999	Commenced training for registered nurses to do Pap smears
2003	Completion of Provincial Cytology/Colposcopy Database redevelopment

Appendix D

Cytology/Colposcopy Registry: data sources, quality, confidentiality and processing

Data sources

The Gynaecological Cancer Screening Program's PCCR records results of all Pap tests performed in the province and most colposcopy encounters. This data collection is authorized under Section 71(5)(e) of the Hospitals Act of Nova Scotia.

Currently, Pap smear information comes from seven laboratories performing gynaecological cytology located in Halifax, New Glasgow, Antigonish, Sydney, Bridgewater, Kentville, and Yarmouth. Colposcopy information is forwarded to the Registry from thirty colposcopists across the province. This report is focused on Pap smear data and does not include a discussion of data relating to the management of cytological abnormalities (i.e. colposcopy).

Pap smear information collected includes patient demographics, screening specifics (e.g., requesting physician name, smear date, smear site, laboratory, previous cytology, slide quality, reason for test, etc.), and screen results. In Nova Scotia, results from cervical cytology testing have been classified using The Bethesda System (TBS) since 2003 (Table D1). This system has replaced the cervical intraepithelial neoplasia (CIN) grading system because it provides better guidance for clinical management (Solomon et al. 2002). All diagnoses prior to 2003 have been coded in TBS and the original CIN terminology retained as well.

Data quality

Data quality is built into every aspect of daily functions. The Registry receives data from

Table D1. Papanicolaou smear nomenclature

CIN (1978)	The Bethesda System (2001)
Unsatisfactory	Unsatisfactory (with comments on smear quality)
Negative for Malignancy	Negative for Intraepithelial Lesion or Malignancy
Negative but Limited by	Negative for Intraepithelial Lesion or Malignancy (with comments on smear quality)
Abnormal/Abnormal not Diagnostic	ASC – US (Atypical Squamous cells of – Undetermined Significance)
	ASC – H (Atypical Squamous cells – Cannot Exclude High Grade Squamous Intraepithelial Lesion)
	AGC – NOS (Atypical Glandular Cells – Not Otherwise Specified)
	AGC – EC (Atypical Glandular Cells – Endocervical Cells)
	AGC – EM (Atypical Glandular Cells – Endometrial Cells)
	AGC – Favor Neoplastic (Atypical Glandular Cells – Favor Neoplastic)
Mild Dysplasia (CIN I)	LSIL (Low Grade Squamous Intraepithelial Lesion, Encompassing HPV/Mild Dysplasia/CIN I)
Moderate Dysplasia (CIN II)	HSIL (High Grade Squamous Intraepithelial Lesion)
Severe Dysplasia/Carcinoma in Situ (CIN III)	HSIL (High Grade Squamous Intraepithelial Lesion)
	AIS (Adenocarcinoma in Situ)
Suggestive for Malignancy	HSIL – S (High Grade Squamous Intraepithelial Lesion – Suspicious)
Positive for Malignancy	Carcinoma Squamous/Adeno

three labs electronically and on hard copy from four other labs. Both electronic and manual edit checks occur when data is loaded into the database. Cases that fail the edit checks are rejected for manual review. A portion of hard copy manual entries are reviewed quarterly to ensure maintenance of standards as set out in the Registry Quality Assurance Guidelines, while yearly system audits are performed to ensure accuracy and completeness of the data.

In 1994, a new laboratory information system was implemented at the QEII, the province's largest laboratory operated by Capital Health (CH). During the transition phase, QEII Pap screening data were archived but not reported to the PCCR, accounting for an absence of approximately 14% of total Pap smears screened in the province in 1994 and 2% in 1995. The QEII lab screens Pap smears from several regions of the province and, therefore, 1994 and 1995 data are incomplete for CH, Colchester East Hants Health Authority and Cumberland Health Authority. Efforts are currently underway to retrieve and reconcile these data within the Registry.

Current known limitations of the data set, in addition to the completeness issue, are the existence of duplicate registrations and the absence of hysterectomy flagging. Duplicate registrations can be resolved within the newly upgraded PCCR which permits the merger of patients clearly identified as duplicates. Once the duplicates are resolved, all women having had a hysterectomy will be flagged in the Registry, further defining the 'at risk' population in Nova Scotia.

Data confidentiality

The data residing in the Registry is the responsibility of the GCSP. Ownership of the data has been vested in the Program on behalf of the Nova Scotia Department of Health. System security is an essential component of the PCCR.

A number of security checkpoints and procedures are in place to ensure that only valid users can access identifiable GCSP Registry information. Each user has a system-defined role assigned to them, which delimits that user's privileges within the application.

Provisions have been made to allow all seven laboratories and the QEII Colposcopy Centre to have on-line access to information originating at their respective institutions. Currently, however, only the QEII Cytology lab staff, QEII Colposcopy Centre Coordinator and data management clerk have access, the other labs not having computer compatibility with the Registry at this time.

Strict rules have been set to govern the release of identifiable information from the Registry. The rules cover release of patient history information for individual women, transmission of this information, the release of information on smear takers, and access to information for research purposes. The GCSP Registry Policies and Procedures Manual documents these rules.

Data processing

Cytology records were extracted from the live database for the years 1988 to 2001, the latter year being the most recent and complete annual data available. The bulk of the Pap screening section of the report, however, utilizes data from 1993 to 2001. Prior to 1993 only postal codes of physicians performing Pap smears were collected in the Registry. Patient postal codes have been collected since 1993 making patient geographical information more consistent and reliable.

Overall Pap screening participation rates were calculated by dividing the number of women aged 15 and older having a Pap screen in a given year by the number of women aged 15 and older in the population for the year of interest (see Table D2 for the number of women screened each year by county and

DHA). Pap screening participation rates were analyzed by age, region and over time. A three-year Pap screening rate was also calculated by dividing the number of women aged 15 and older with at least one Pap screen in a three-year period by the number of women aged 15 and older in the population for the mid-point of the three-year period. For example, the three-year rate for the period 1999-2001 would be based on the number of women with at least one Pap screen between those years (256,208) divided by year 2000 population aged 15 and older (395,945).

Pap screening participation rates were also age-standardized to the 1991 Canadian population to allow for meaningful comparisons at the county and DHA levels. Age-standardized rates were also used to compute the Average Annual Percentage Change (AAPC) and Comparative Pap Screening Participation Figures (CPSPF) over time and by region, using methods already described for the Cancer Registry data (see Appendix A), the CPSPF being a variant of the Comparative Incidence Figure and differing in name only. 1994 data were dropped from all trend analyses for reasons previously discussed (see Data Quality).

Specimen turnaround times were measured as the difference between the date the smear was received by a lab and the date the result was reported. It does not include the amount of time it takes to get to the lab or the amount of time it takes for a doctor to communicate the results back to the patient.

Table D2. The number of women aged 15+ screened, by year and region, Nova Scotia 1993-2001

County	1993	1994	1995	1996	1997	1998	1999	2000	2001
Annapolis	3,036	3,252	3,297	3,506	3,430	3,457	3,357	3,429	3,178
Antigonish	2,806	2,810	2,830	3,023	3,109	3,120	3,247	3,384	3,322
Cape Breton	14,129	14,925	14,980	15,003	16,013	16,735	16,778	16,072	16,189
Colchester	6,439	5,769[1]	6,669[1]	6,794	7,086	7,269	7,395	7,573	7,517
Cumberland	4,911	4,227[1]	4,471[1]	4,713	4,538	4,309	4,590	4,476	4,429
Digby	3,158	3,081	3,219	3,378	3,283	3,286	3,207	3,161	3,257
Guysborough	1,517	1,575	1,462	1,705	1,544	1,688	1,646	1,697	1,717
Halifax	58,821	52,782[1]	61,105[1]	62,413	62,754	63,313	64,677	65,450	65,554
Hants	6,944	6,168[1]	7,055[1]	7,199	7,341	7,403	7,342	7,286	7,375
Inverness	2,357	2,326	2,374	2,426	2,559	2,646	2,704	2,520	2,659
Kings	8,535	8,762	9,072	9,456	9,486	9,636	9,669	9,711	9,644
Lunenburg	7,185	7,126	7,523	7,524	7,672	7,831	7,902	8,263	8,311
Pictou	7,025	7,352	7,215	7,349	7,511	7,418	7,651	7,685	7,893
Queens	1,808	1,750	1,818	1,860	1,985	2,035	1,969	2,007	2,008
Richmond	1,532	1,576	1,595	1,536	1,535	1,623	1,666	1,598	1,574
Shelburne	1,804	1,767	1,824	1,867	1,875	1,838	1,974	1,999	2,182
Victoria	979	822	941	986	974	1,019	1,053	1,111	1,101
Yarmouth	4,008	4,122	4,170	4,339	4,234	4,299	4,469	4,652	4,646

District Health Authority	1993	1994	1995	1996	1997	1998	1999	2000	2001
South Shore Health	8,993	8,876	9,341	9,384	9,657	9,866	9,871	10,270	10,319
South West Health	8,970	8,970	9,213	9,584	9,392	9,423	9,650	9,812	10,085
Annapolis Valley Health	11,571	12,014	12,369	12,962	12,916	13,093	13,026	13,139	12,822
Colchester East Hants Health Authority	9,839	8,859[1]	10,191[1]	10,449	10,771	11,043	11,138	11,349	11,305
Cumberland Health Authority	4,911	4,227[1]	4,471[1]	4,713	4,538	4,309	4,590	4,476	4,429
Pictou County Health Authority	7,025	7,352	7,215	7,349	7,511	7,418	7,651	7,685	7,893
Guysborough Antigonish Strait Health Authority	6,791	6,936	6,880	7,285	7,259	7,562	7,695	7,794	7,769
Cape Breton District Health Authority	16,529	17,098	17,302	17,394	18,475	19,269	19,399	18,588	18,793
Capital Health	62,365	55,860[1]	64,638[1]	65,957	66,410	66,942	68,276	68,960	69,141

[1] Underreporting of data in 1994 and 1995. See data quality in Appendix D

Appendix E

Cancer incidence and mortality rates by regions

Table E1. Cancer incidence rates[1] for selected invasive gynaecological cancers, by region, Nova Scotia 1997-2001

County	Cancer Site					
	Cervix	95% CI[2]	Ovary	95% CI[2]	Body of Uterus	95% CI[2]
Annapolis	8.6	[-0.7, 17.9]	13.7	[4.1, 23.2]	18.7	[9.2, 28.2]
Antigonish	3.3	[-1.3, 8.0]	7.5	[-0.1, 15.0]	13.6	[4.1, 23.2]
Cape Breton	18.5	[13.6, 23.4]	15.0	[11.1, 19.0]	21.9	[17.3, 26.5]
Colchester	16.7	[9.4, 24.0]	19.1	[12.3, 25.8]	17.0	[10.5, 23.5]
Cumberland	10.9	[3.8, 18.0]	16.2	[8.1, 24.2]	14.6	[7.9, 21.3]
Digby	11.6	[2.7, 20.6]	10.8	[3.5, 18.1]	14.9	[6.2, 23.5]
Guysborough	3.0	[-2.9, 9.0]	10.2	[0.1, 20.3]	26.1	[9.8, 42.3]
Halifax	10.2	[8.2, 12.1]	15.8	[13.3, 18.3]	19.0	[16.3, 21.8]
Hants	5.6	[1.0, 10.2]	12.1	[5.9, 18.3]	12.0	[5.4, 18.6]
Inverness	13.1	[3.0, 23.2]	14.3	[4.9, 23.9]	22.2	[11.0, 33.4]
Kings	5.6	[1.8, 9.4]	12.8	[7.5, 18.1]	14.6	[9.0, 20.1]
Lunenburg	14.6	[7.9, 21.3]	20.5	[13.5, 27.6]	23.5	[16.2, 30.8]
Pictou	9.8	[4.3, 15.2]	15.2	[8.8, 21.5]	18.7	[11.8, 25.6]
Queens	7.7	[-2.8, 18.2]	7.9	[0.0, 15.7]	29.4	[13.2, 45.6]
Richmond	7.5	[-1.1, 16.2]	22.2	[6.6, 37.7]	34.6	[14.8, 54.4]
Shelburne	13.6	[2.7, 24.4]	13.7	[3.4, 23.9]	26.8	[12.5, 41.1]
Victoria	37.2	[8.2, 66.2]	3.6	[-3.4, 10.6]	22.2	[4.1, 40.2]
Yarmouth	9.2	[1.7, 16.8]	4.0	[0.0, 7.9]	16.8	[8.2, 25.3]
District Health Authority						
South Shore Health	13.3	[7.5, 19.1]	18.1	[12.2, 23.9]	24.6	[18.0, 31.3]
South West Health	11.1	[6.0, 16.2]	8.7	[4.8, 12.7]	18.9	[13.0, 24.8]
Annapolis Valley Health	6.0	[2.6, 9.5]	12.9	[8.4, 17.4]	15.7	[11.0, 20.5]
Colchester East Hants Health Authority	14.5	[8.8, 20.1]	17.9	[12.3, 23.6]	15.2	[9.9, 20.5]
Cumberland Health Authority	10.9	[3.8, 18.0]	16.2	[8.1, 24.2]	14.6	[7.9, 21.3]
Pictou County Health Authority	9.8	[4.3, 15.2]	15.2	[8.8, 21.5]	18.7	[11.8, 25.6]
Guysborough Antigonish Strait Health Authority	4.5	[1.1, 7.8]	12.2	[6.6, 17.8]	22.5	[14.9, 30.2]
Cape Breton District Health Authority	19.5	[14.8, 24.3]	14.3	[10.8, 17.8]	22.1	[17.8, 26.4]
Capital Health	9.7	[7.8, 11.6]	15.5	[13.1, 17.9]	18.6	[16.0, 21.3]
All Nova Scotia	**11.3**	**[10.0, 12.6]**	**14.9**	**[13.5, 16.4]**	**19.3**	**[17.7, 21.0]**

[1] Rates are standardized to the age distribution of the 1991 Canadian population
[2] The 95% confidence interval (range within which a value is expected to fall within a given probability)

Table E2. Cancer mortality rates[1] due to selected invasive gynaecological cancers, by region, Nova Scotia 1997-2001

County	Cancer Site: Cervix	95% CI[2]	Ovary	95% CI[2]	Body of Uterus	95% CI[2]
Annapolis	2.0	[-0.8, 4.9]	9.4	[3.7, 15.1]	6.3	[1.0, 11.7]
Antigonish	2.2	[-2.2, 6.6]	4.1	[-1.7, 10.0]	3.3	[-1.3, 8.0]
Cape Breton	5.6	[3.0, 8.2]	9.1	[6.1, 12.0]	4.4	[2.5, 6.3]
Colchester	1.2	[-0.5, 3.0]	8.2	[3.8, 12.6]	2.7	[0.3, 5.2]
Cumberland	2.9	[-0.1, 5.9]	6.7	[2.2, 11.1]	2.9	[0.3, 5.5]
Digby	2.0	[-0.9, 4.8]	10.2	[3.1, 17.2]	3.2	[0.0, 6.3]
Guysborough	0.0	[0.0, 0.0]	7.6	[-1.2, 16.3]	10.5	[0.0, 21.1]
Halifax	3.5	[2.5, 4.6]	6.7	[5.1, 8.3]	2.6	[1.6, 3.5]
Hants	5.3	[0.9, 9.7]	8.8	[3.5, 14.1]	5.7	[1.1, 10.2]
Inverness	2.9	[-1.2, 6.9]	12.3	[3.5, 21.2]	1.9	[-0.8, 4.6]
Kings	2.4	[0.0, 4.8]	7.7	[3.6, 11.7]	1.9	[0.0, 3.8]
Lunenburg	5.2	[1.3, 9.0]	6.0	[2.5, 9.5]	1.7	[0.0, 3.4]
Pictou	2.5	[0.2, 4.9]	6.8	[2.9, 10.6]	5.2	[1.6, 8.7]
Queens	4.2	[-1.7, 10.1]	3.8	[-1.7, 9.3]	1.4	[-1.3, 4.1]
Richmond	0.0	[0.0, 0.0]	8.5	[-1.2, 18.1]	8.6	[0.2, 17.0]
Shelburne	0.0	[0.0, 0.0]	10.1	[1.1, 19.1]	4.5	[-0.8, 9.8]
Victoria	8.7	[-3.4, 20.9]	4.5	[-4.3, 13.4]	15.1	[0.1, 30.2]
Yarmouth	2.5	[-1.1, 6.1]	2.8	[0.0, 5.6]	3.0	[-0.5, 6.5]
District Health Authority						
South Shore Health	4.9	[1.7, 8.2]	5.5	[2.6, 8.5]	1.7	[0.2, 3.1]
South West Health	1.7	[-0.1, 3.5]	7.2	[3.7, 10.7]	3.5	[1.2, 5.8]
Annapolis Valley Health	2.4	[0.5, 4.3]	8.4	[5.0, 11.8]	3.2	[1.1, 5.3]
Colchester East Hants Health Authority	2.5	[0.2, 4.7]	7.2	[3.6, 10.8]	3.2	[0.8, 5.6]
Cumberland Health Authority	2.9	[-0.1, 5.9]	6.7	[2.2, 11.1]	2.9	[0.3, 5.5]
Pictou County Health Authority	2.5	[0.2, 4.9]	6.8	[2.9, 10.6]	5.2	[1.6, 8.7]
Guysborough Antigonish Strait Health Authority	1.5	[-0.6, 3.7]	6.4	[2.4, 10.4]	5.6	[2.1, 9.2]
Cape Breton District Health Authority	5.4	[3.1, 7.7]	9.2	[6.4, 12.0]	4.9	[3.0, 6.8]
Capital Health	3.6	[2.4, 4.7]	7.1	[5.5, 8.7]	2.8	[1.8, 3.8]
All Nova Scotia	**3.4**	**[2.7, 4.1]**	**7.4**	**[6.4, 8.4]**	**3.5**	**[2.9, 4.2]**

[1] Rates are standardized to the age distribution of the 1991 Canadian population
[2] The 95% confidence interval (range within which a value is expected to fall within a given probability)

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PAP SCREENING for Life

Cancer Care Nova Scotia
1278 Tower Road
5th Floor, Bethune Building
Halifax, NS B3H 2Y9

Toll free: 1-866-599-2267
Fax: (902) 473-4631
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